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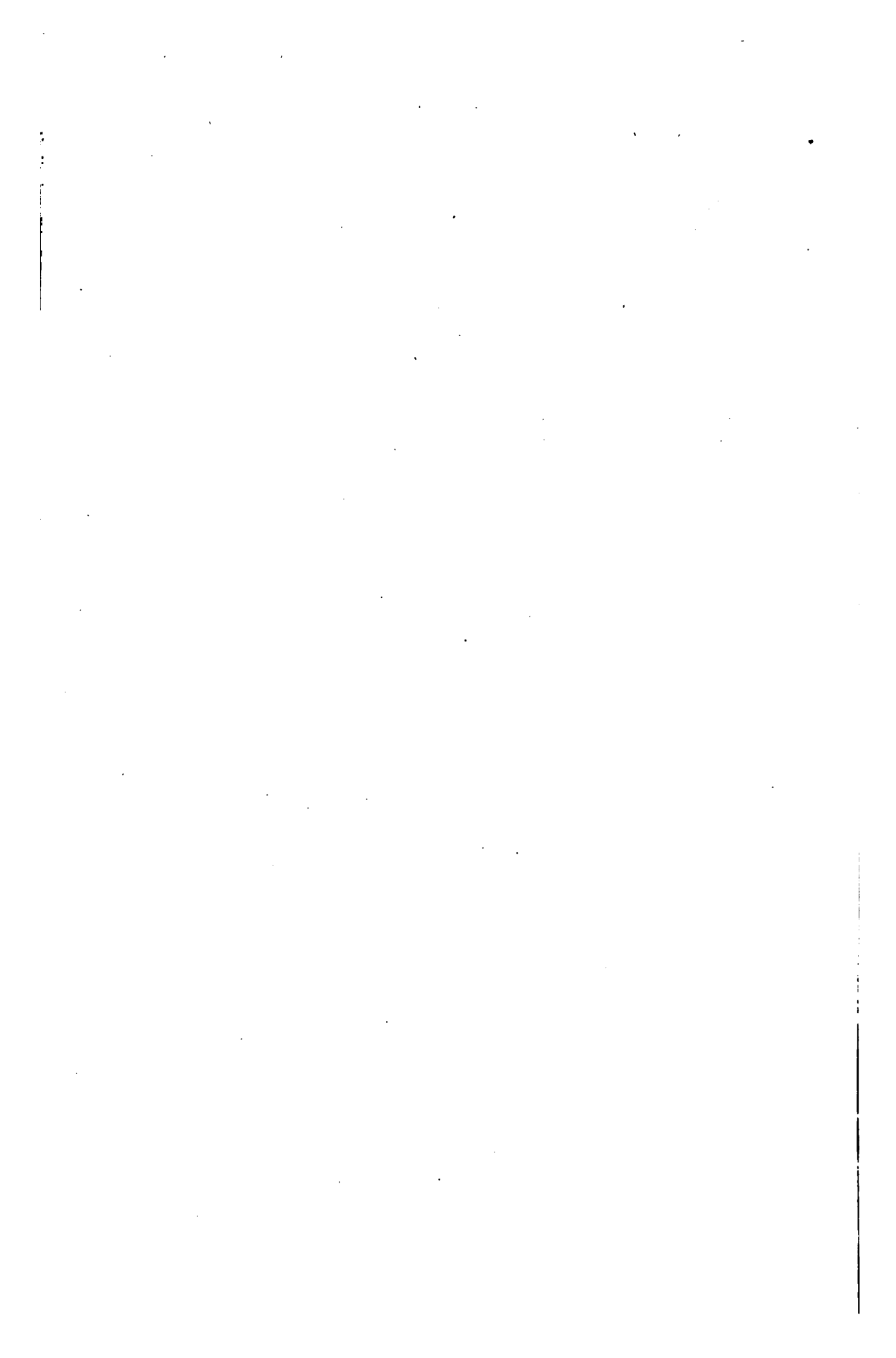
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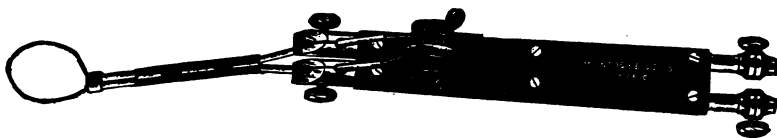
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FOURTH ANNUAL MEETING
OF THE
NATIONAL
Association of Railway Surgeons

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BUFFALO, N. Y., APRIL 30 and MAY 1,

1891.



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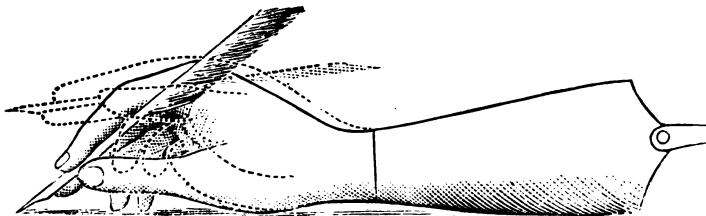
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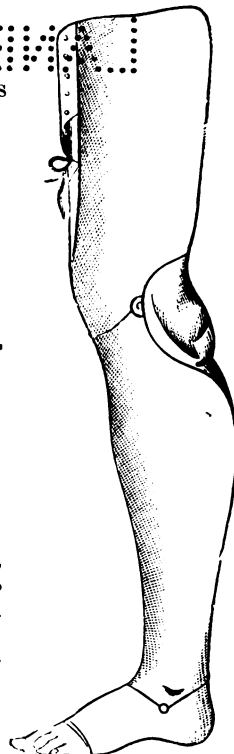
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**DR. J. W. JACKSON, DECEASED, FIRST PRESIDENT OF THE NATIONAL
ASSOCIATION OF RAILWAY SURGEONS AND SURGEON-IN-
CHIEF WABASH RAILWAY.**

PUBLISHERS' NOTE.

The publication of this volume by the Railway Age Publishing Company was arranged for by the Committee on Publication of the National Association of Railway Surgeons.

The work of publication, this being the first presentation of the proceedings of the Association in volume form, needed the compilation of a good deal of original matter. The work, however, was taken in hand at once and was far advanced in July last, when the negotiations for the sale of the Railway Age newspaper were commenced. The sale was completed on September 1, the new proprietors, however, did not take charge of the business until October 1, at which date the consolidation of the Railway Age and Northwestern Railroader newspapers was effected. The work of publishing these proceedings, which had meanwhile been delayed, was at once taken up by the new management and has been pushed through without any unnecessary delay. Had it not been for the interruption caused by the above negotiations the volume would have been issued in August or September, 1891.

The publishers desire to express here their sense of indebtedness to Dr. R. Harvey Reed of Mansfield, O., for his invaluable assistance in the preparation of this volume, as well as for the excellent service he has rendered as editor of the Surgical Department of the Railway Age and Northwestern Railroader.

Chicago, December 30, 1891.

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PROCEEDINGS OF THE FOURTH ANNUAL MEETING OF
THE NATIONAL ASSOCIATION OF RAIL-
WAY SURGEONS.

The Fourth Annual Meeting of the National Association of Railway Surgeons, was held at Buffalo, N. Y., on April 30 and May 1, 1891. The programme arranged for the meeting was as follows:

THURSDAY, APRIL 30.

10 A. M.

Call to Order by the President.

Prayer.

Address of Welcome by the Mayor.

Address of Welcome in behalf of the Medical Profession of

Buffalo.....by W. S. Tremaine, M. D.

Response.....by the President.

Report of the Corresponding Secretary.

Report of Committee of Arrangements.

2 P. M.

1. Practical Value of an Early and Accurate Diagnosis,

W. A. Phillips, Jr., M. D., Salina, Kan.

2. Biology of Fungi (Bacteria)

L. Bradley Dorr, M. D., Buffalo, N. Y.

3. Antiseptic Surgery in Railway Practice,

J. P. Klingensmith, M. D., Blairsville, Pa.

8 P. M.

4. An Ambulance, Operating and Funeral Car, with Models,

S. L. McCurdy, M. D., Dennison, O.

5. Selecting Nominating Committee.

6. Miscellaneous Business: Revision of Constitution, etc.

7. Courtesies Extended to Exhibitors.

8 *PROCEEDINGS OF THE ANNUAL MEETING.*

FRIDAY, MAY 1.

10 A. M.

8. Conservatism in Surgery, with Cases,
A. J. Mullen, Jr., M. D., Michigan City, Ind.
9. Amputations in the Light of Prothetical Science,
Charles Truax, Chicago, Ill.
10. Discussion of Best Methods for the Care of the Injured, Hospital
Plans, etc.
11. Case of Foreign Body in the Bladder A. J. Mullin, M. D.

2 P. M.

12. Tetanus Roswell Park, M. D., Buffalo, N. Y.
13. Car Couplers J. F. Pritchard, M. D., Manitowoc, Wis.
14. Case of Crushed Kidney Caused by a Railway Accident,
Herman Mynter, M. D., Buffalo, N. Y.

8 P. M.

15. Address by the President,
W. B. Outten, M. D., St. Louis, Mo.
16. Fracture of the Astragalus with Irreducible Displacement of the
Fragment R. Harvey Reed, M. D., Mansfield, O.
17. Election of Officers.

SATURDAY, MAY 2.

10 A. M.

18. Chronic Inflammation in the Treatment of Railway Injuries in
High Altitudes A. W. Bariteau, M. D., Oberlin, Kan.
19. Relation of Railway Injuries to Defects of Sight,
A. A. Hubbell, M. D., Buffalo, N. Y.
20. A Case of Real Spinal Injury,
A. W. Ridenour, M. D., Massillon, O.

SATURDAY AFTERNOON—EXCURSION TO NIAGARA FALLS.

COMMITTEE OF ARRANGEMENTS.

Roswell Park, M. D.	J. G. Thompson, M. D.,
W. S. Tremaine, M. D.	Angola, N. Y.
W. D. Green, M. D.	C. M. Daniels, M. D.
S. G. Dorr, M. D.	W. H. Slacer, M. D.
B. H. Daggett, M. D.	A. A. Hubbell, M. D.
W. C. Phelps, M. D.	John Parmenter, M. D.
A. G. Gumaer, M. D.	W. H. Heath, M. D.

Headquarters of executive committee at Tiff House. Head-
quarters of officers at Iroquois.



PRESIDENT J. H. MURPHY, M. D., ST. PAUL, MINN.

FIRST DAY.

The meeting was called to order at 10 A. M. of April 30 in the Concert Hall by Dr. W. B. Outten, president, in the chair.

Prayer was offered by the Rev. T. S. Samson.

President Outten then introduced the Hon. Charles F. Bishop, mayor of Buffalo, who was greeted with applause, and spoke as follows:

ADDRESS OF THE HON. C. F. BISHOP OF BUFFALO.

Gentlemen of the National Association of Railway Surgeons:

It is scarcely necessary at this time for me to tell you that we welcome you to our city. I am sure the proper committees have by their actions, not less than their words, told you that, and what I am expected to do is the merest formality. But you are not welcomed by your medical brethren alone. Buffalo is a sensitive as well as hospitable city and all her people are gratified to have assembled here any of the numerous bodies of intellectual and scientific men of our country and to listen to their discussions of the great questions which engage their attention. Though these discussions may be too learned and technical for laymen to fully master, yet we know that to our own professional and scientific people they are full of meaning and broaden and improve their thoughts and methods. But you, the assembled wisdom of the railway surgeons of our country, are especially welcome because your visit is so timely.

Many years ago, in the days of her youth, our city was possessed of great beauty. Like Annie Laurie, her face it was the fairest that e'er the sun shone on. But as time passed on and wealth, commerce and general prosperity came to her with age, the lines of beauty gradually changed to lines of care, anxiety and railways, and the graceful dimples which so delighted the eye of the beholder deepened and widened and hardened until now we scarce recognize in this scarred and faded countenance the beautiful and laughing vision of our youth.

We have tried to endure it all with a mournful smile and say that it is a necessary change, but as one after another of our citizens have fallen victims to these unpromising lines we have lost patience, and for several years a jury of commissioners have been diagnosing the

case, and after most solemn counsels have agreed that the disease is a virulent type of railway grade crossings and embankments, and that the only proper treatment to be administered is the heroic one of excision.

But now comes the question, Who shall be the surgeon? Now I know that wonderful progress has been made in the medical profession in the past few years, and in no branch so great as in surgery, and I ask of you, gentlemen, a careful consideration of this question of railway surgery. How can the blemishes of grade crossings and embankments be removed from Miss Buffalo's face and her original beauty restored without endangering her prosperity? It was an ancient custom for the officials of cities to meet distinguished guests at the gates and present to them the keys of the city. Unfortunately we have neither gates nor keys for them; but if you, gentlemen, in your deliberations shall devise among other benefits to humanity a means of relieving our city from this unnatural growth you will need no key, for our latch-string will always hang outside and you will be welcome to everything we have. Again, gentlemen, on behalf of the citizens of Buffalo I extend to you a hearty and fraternal welcome and the freedom of the city without reserve, and trust that when your labors are here completed and you return to your homes you will take with you only pleasant memories and the desire to come again.

The president then introduced Dr. W. S. Tremaine of Buffalo, who delivered the following address of welcome on behalf of the local medical profession:

ADDRESS OF DR. W. S. TREMAINE OF BUFFALO.

Gentlemen of the National Association of Railway Surgeons:

I wish to welcome you on behalf of the medical profession of Buffalo—the more worthy half. When the only representative that you have here, your corresponding secretary, Dr. Gumaer, called upon me with a request to perform this duty I endeavored to “switch” him off on to somebody else—a more truly representative. But he said “no,” and I suppose his reason for saying “no” was the fact that I had been at one time a railway surgeon, although not a member of your august body.

It was a matter of surprise to me why the National Association of Surgeons should have selected this city as their place of meeting, as you have only one member here, I understand, but on thinking the matter over I came to the conclusion that you were bent for missionary work and recognized our benighted condition and came to elevate us in the opinion and fellowship of your own body. [Ap-

plause.] You probably knew that we had about 600 miles of railway within the city limits; that we had 250 grade crossings—that we had all of these elements of slaughter in our hands, and that through sympathy you decided to meet here.

It has been said that the wise men came from the East, but judging from this association some of the members must have gone West and have increased in wisdom by their residence in the West, and it is but justice that they should return to the East and endeavor to spread their wisdom and give back that which they originally got from the East a hundred fold. It is painful and humiliating that most of the new members of your association have taken up their residence in the active, progressive West. I am a good deal of a western man myself; I lived in the West for a long time and I sometimes get impatient with eastern conservatism. I hope your deliberations here will shake us up.

There is one subject I would like to touch upon, but I do not know whether I ought to do so or not. I hope in your deliberations that you will do something toward remedying or rather bettering the wretchedly poor compensation that some railway surgeons receive from railway companies for their work. I do not see any earthly reason why a medical man, a railway surgeon, who renders service to a railway corporation, or to the employes of that corporation, should not be as well paid as the legal functionary. He is as indispensable to the corporation as the lawyer. I hope you will do something to counteract this condition of affairs. I do not see any reason why a railway surgeon should not be as important an officer of the company as the superintendent or general manager.

When Dr. Gumaer asked me to make this address of welcome on behalf of the medical profession I accepted the position reluctantly, but after talking the matter over with my professional brethren I found that some of them, as is usually the case, could not see you at their homes during the day on account of being busy, but that in the evenings they would probably, some of them at least, find time to show you some kindness and attention. I feel quite sure that the will of the profession of Buffalo is there if the power exists to get away from their homes. We have only "400" physicians in Buffalo [laughter] and I welcome you in their behalf.

Dr. Gumaer also said to me that a written address was not necessary; that all that was needed in such a speech was to interject a joke, and it is that joke that has been bothering me so much. I could not find one appropriate for this occasion. I consulted Artemus Ward, Sydney Smith and other authors and could find nothing to fit

in, and I was afraid that if I did find something some one would cry out "Chestnuts!" [Laughter and applause.]

Again, I welcome you in behalf of the "400" of Buffalo.

RESPONSE OF THE PRESIDENT TO ADDRESS OF WELCOME.

President Outten replied to the address of welcome saying:

Mr. Mayor and Dr. Tremaine:

On behalf of the association I desire to express, not only our pleasure, but sincere thanks for the words that you have both uttered.

We regret one thing as far as Buffalo is concerned—that while its fair face and beauteous proportions have been destroyed by the railway systems you have, and likewise that your surgeons do not get proper compensation, we are sorry in one direction we cannot rectify it; in the opposite direction I will say that if the surgeon maintains his native independence and is true to his art, it is only a matter of time when these corporations will come to terms. Out West we were placed in this position at one time, but we have gradually grown until now we have great long railway systems sweeping across the state plains and around the Rocky Mountains and have become an essential part in their operations. We are recognized as human beings and as essential factors in the operative work of railways.

Take, for instance, your city (Buffalo) with its streets, its large number of grade crossings, etc., and you are apt to wonder why more lives are not lost. There is resentment at first, but it is one of the elements that has made your city what it is to-day. I can say that the best thing possibly that Buffalo can do is to adapt herself to given conditions. It is not by any fight alone that you can accomplish much, but it is by working hand in hand with the railway officials, talking and consulting with them in these matters, that we accomplish more.

As far as what Dr. Tremaine has said is concerned with regard to railway corporations and the small compensation that surgeons receive from them, it is not in consequence of the railroads at all, but the matter lies almost entirely with the profession themselves. It arises from the fact that certain members of the profession are willing to sacrifice their individuality and place themselves at the "beck" and "call" of office. They work for a trifling compensation, or perhaps for a pass, which amounts not to a row of pins, if I may be permitted to use the term. If the profession does not maintain its individuality, then who is going to do it? We will grant one thing and it is this: We can show that we have to use brains in the profession of

medicine, and brains are always of value. The officials of railway corporations will see the time has come when the physician will not only be an essential, but an economic factor in the operation of any railroad system. [Applause.]

I am a sticker on one point; I have an absolute love for my profession; I do not like to see anyone trying to pull it down. It has been my fortune within the last fourteen years to have directly under my guidance from 500 to 600 physicians and during that time not a single one can say I ever asked him to work for a pass or to tell a lie, but I have insisted upon him maintaining the dignity of his profession, of standing as an individuality, practicing purely his profession and ignoring everything foreign to it. [Loud applause.]

Dr. E. R. Lewis of Kansas City moved that the physicians of Buffalo be made members by invitation with the privilege of participating in the discussions. Carried.

Dr. C. P. Cole of Helena, Mont., chairman of the committee on revision of the constitution and by-laws, submitted his report, reading of which was postponed until the afternoon session.

Secretary Lewis read a letter from Dr. William A. Phillips, Jr., of Salina, Kan., expressing his regret at not being present to read the paper which he had promised, also a communication from Dr. W. Duncan of Savannah, Ga.

The report of the committee on arrangements was made through its chairman, Dr. Gumaer. He said that it had fallen to his lot, as the only member of the association in Buffalo, to look after a good deal of *minutiae* in regard to the association. He had been burdened pretty heavily early in the year and had invited a number of the local physicians and surgeons to assist on the committee of arrangements. They had given him good counsel and had done all in their power to make the meeting a success. Many receptions were contemplated, but declined with thanks owing to the fact that the association met for business rather than pleasure. One of the members of the committee of arrangements early requested that he be allowed to give a reception to the members of the association, and Dr. Gumaer thanked him for his interest and good intentions and told that him he could give a reception. Preparations were accordingly made and tickets could be procured at the secretary's desk, the reception to be given by Dr. and Mrs. B. H. Daggert, from 8 to 11 o'clock on the evening of the first day's session.

The committee had also arranged for an excursion on Saturday afternoon to Niagara Falls.

The association then adjourned till 2 P. M.

AFTERNOON SESSION.

The meeting reassembled at 2 P. M., the president being again in the chair.

The president stated that the first business in order was the consideration of the constitution and by-laws.

Dr. H. Nye of Enon Valley, Pa., moved that the articles be read and voted upon *seriatim*. Carried.

The secretary then read the constitution and by-laws, article by article and section by section, which were adopted *seriatim* as read.

Dr. R. Harvey Reed of Mansfield, O., then moved that the constitution and by-laws as adopted *seriatim* be adopted as a whole. Carried.*

Dr. L. Bradley Dorr of Buffalo contributed a paper on the "Biology of Fungi," which, on motion, was received and referred to the committee on publication without discussion.

BIOLOGY OF THE FUNGI.

I was persuaded to bring this subject before you from the fact that few of the text books that treat of the vegetable parasites and saprophytes give any definite idea of the exact place in the organic world which the fungi occupy and the reasons for their classification.

The first fact in the classification of this group is that they are vegetable, as I have mentioned above. You well know that some of the bacteria have motion and feed upon organic matters. These circumstances would at first lead one to the belief that they were animal. The distinction between animal and vegetable, however, places them in the vegetable kingdom. It may be well to state the characteristics which divide one from the other. The first is the morphological fact that vegetable cells are almost always enveloped in a cellulose containing a sac, differing entirely from the protoplasm of the cell, it being a segregation of the starch granules found in the protoplasm and not a modification of the protoplasm itself. The animal cell has no enveloping cellulose sac, but a modification of its protoplasm for the purpose of protection. This difference in structure brings about a difference in nutrition. The plants draw their nutriment by simple imbibition through the cell wall from the surrounding medium, a process which necessitates that their food be in the liquid form. The unicellular animals are able to take in solid nutriment by means of interruptions in the continuity of the cell wall and are able afterward to reduce this solid food, if of a suitable composition, to a liquid state. A more important distinction between these two kinds of cells is the material they feed upon, rather than the manner of their feeding. Under the present condition of the globe no cell which has animal characteristics can maintain its life upon substances spontaneously produced—in other words, animals cannot live upon purely inorganic substances, but must have albumins and proteids which are nowhere obtained except as the product of life processes. Vegetables have the power of deriving nourishment and flourishing upon purely inorganic material, such as carbon dioxide, water, ammonia and salts.

With these distinctions between animal and vegetable clearly before us, we

* The constitution and by-laws as here adopted. See Appendix A.



PAST PRESIDENT W. B. OUTTEN, M. D., ST. LOUIS, MO.

can better appreciate the difference between the fungi and green plants. The lowest subkingdom of the vegetable world is divided into the algæ and fungi. The basis of this division is that the algæ contain a green coloring substance called chlorophyll, while the fungi are devoid of it. The chlorophyll enables the plant to elaborate from such simple substances as CO_2 , H_2O and carbon dioxide, water, ammonia, sulphur and phosphorus, very complex compounds as albumins and proteids. The plants which do not contain chlorophyll, *i. e.*, the fungi, are unable to convert such elementary materials into protoplasm, and require for their food things that can, by a moderate amount of work, be transformed into protoplasm. Thus it happens that the algæ are colored plants, requiring light for their existence, and thrive upon binary compounds; while the fungi are colorless, can live in the dark, and require tertiary compounds for their food. It is this lack of chlorophyll that causes the fungi to be such destroyers of both living and dead organic substances.

The fungi are placed in four divisions, according to their different modes of reproduction. The lowest in the scale are unicellular plants that multiply asexually; and in every respect present the most primitive characteristics of life. In this class new individuals are formed by the splitting up of one cell into several others, which go through the same cycle of life as the parent. These are called the prototypes and include the schistomycetes, or bacteria, and the saccharomyces or yeasts. Under the name of schistomycetes are included all those vegetable forms which cause most of the putrefactive changes and diseased conditions, and are commonly known as bacteria. Bacteria must have, in order to live, substances containing sulphur, phosphorus, magnesium, potassium, sodium and organic compounds as albuminoids and carbohydrates, and these must be associated with a certain amount of water. Most of the bacteria require free oxygen, and are called ærobie; others are anærobie, and cannot live in the presence of oxygen. Temperature is one of the most important factors in the development of bacteria, and very few of them can live in a temperature below 20 or above 65 degrees centigrade. Most of the parasitic bacteria live only at the body temperature of the host they generally invade, or within a short range of the host's normal temperature. Parasitic bacteria may become, under certain circumstances, saprophytic; that is, they may adapt themselves in such a manner to their surrounding circumstances as to be able to live upon dead materials. There are a great many substances that prevent the development, and in strong solutions kill the bacteria outright; such as bichloride of mercury, bromine and iodine. In some cases the fermentative action of the fungi gives rise to products which arrest the development of the fungi themselves, as in alcoholic fermentation. Bacteria must have a considerable amount of water mixed with their food in order for them to assimilate it, as is illustrated by the fact that fruit canned with sugar does not ferment, condensed milk does not sour and dried and salted meats do not putrefy.

It would appear from the above statements that bacteria were very exacting in their physiological requirements and that slight deviations from their normal environment caused them to die. But most bacteria can stand slow desiccation and when in a dried state maintain their properties for a long time and can exhibit these properties again when they reach suitable conditions of moisture and temperature. Another method they have of resisting destructive influences is by the formation of spores. Bascilli under favorable surroundings multiply by a division of one cell into two, but when the nutriment becomes scarce or other deleterious circumstances arise they form spores. The contents of the bacterial cells become concentrated at certain points, darker and more highly refracting than the rest of the

cell. These points combine to form a bright body, generally egg shaped, enveloped in a thick spore membrane and this again inclosed in the spore, bearing cell, which has a clear, translucent appearance.

In keeping up the species the usefulness of the spore is very evident. It can stand much higher and lower temperatures than the bacillus from which it was derived and is almost invulnerable to antiseptics. When the spore, after months or even years, attains proper surroundings it begins to swell, the contents lose their gleaming appearance, the tough spore membrane bursts and sets at liberty a young bacillus.

A fact of great importance to future medicine is the constant struggle among the bacteria themselves. Micrococci may be thrust aside by microbacteria, bacilli may be killed by bacteria terms when the supply of food is insufficient for both and one species may be poisoned by the leukomims or stomanes of another.

The factors which determine the invasion and course of development of bacteria within the animal system are two. The bacteria must have vital properties that enable them to exist in the animal body, and there must be a predisposition on the part of the host. Very slight changes in the tissues of an animal will render them susceptible to bacterial invasion, as when the vegetable ferment known as papayotin is injected into the blood a rapid development of micrococci results, so that in two hours the heart is found swarming with them. In other cases some disturbance of the circulation brings about a lessened resistance on the part of the tissue, which easily accounts for the development of the fungi. A great many cases of predisposition cannot be accounted for by any anatomical or physiological anomalies that we can discover. We know, for example, of no reason why some individuals should have immunity from scarlatina, typhoid, whooping cough, small-pox and tuberculosis after exposure and yet others be affected. The differences which decide the matter are either of such apparent slowness or our methods are not delicate enough to discover them, yet they must be special differences.

Bacteria do harm in two ways; by their rapid multiplication they withdraw nutriment from the tissues in which they grow and by producing marked chemical changes in the media they infest. They set up putrid decomposition in albuminoid bodies, change sugar into lactic acid and lactic acid into butyric, as in soured milk and rancid butter. When albuminoids undergo decomposition, as the result of these micro-organisms, we have such a chemical substance produced as the fatty acids, aromatic matters, indol, phenol, hydroquinone inorganic compounds as hydrogen sulphide, carbon dioxide and water besides leucomaines in the living tissues as the tox albumin of diphtheria. Two good illustrations of these different modes of action are found in anthrax and diphtheria. The organs of an animal suffering from anthrax will be found upon examination with the microscope to be loaded with the bacilli, while in diphtheria the organism is generally found only at the seat of inoculation and the changes in the system are caused by the leucomaine it generates.

With this brief description of the smallest and most important of the fungi I will now take up the next in size and importance, namely the yeast plants. A yeast plant is a globular organism about 1-500 of an inch in diameter, has a hard cellulose containing sac, with soft contents, in the center of which is a vacuole. Yeast multiplies in two ways according to its environment. Budding is the most usual method; little globules, or wart-like appearances, arise from the periphery of the yeast cell and grow larger in size until nearly as large as the parent, when the buds are abstricted and form a new individual. If grown upon potato the process of multiplication is by means of ascospores; that is, the contents of the mother cell gives rise to several

daughter cells inside of the parent sac. These escape and repeat the same life history. Yeast can be dried and in this state live for a long time, withstanding much greater ranges of temperature than when active. The less oxygen that yeast can get the more active it is in breaking up sugar into alcohol and carbon dioxide. The reason is supposed to be that the yeast must have oxygen, and if not obtained free it breaks down the sugar, separating the oxygen.

This finishes the class of fungi called the protophytes—although the smallest in size of all living organisms, yet the greatest curse to mankind. This has been well illustrated in the recent months by the thousands of victims of the "grippe" microbe, and by thousands of other victims who have drunk too heavily of the product of the yeast plant in order to increase their resisting power against the epidemic.

The next class of fungi is called the zygosporæ—interesting from the fact that their method of reproduction illustrates the simplest form of sexual generation called conjugation. Two precisely similar cells coalesce to form a mother cell or a zygospore; this finally breaks up into several daughter cells exactly like the two conjugating cells. The representatives of this group are some microscopical fungi that grow upon decaying wood and some mucors that grow upon heaps of horse manure.

The next group, called the oosporæ, represent a little higher development, and deserve attention on account of the injury they do to the human race, directly and indirectly. The life history of blue mould or *penicillium glaucum* is the same as that of all the individuals of this group. Blue mould grows on a great variety of substances, as ink, old leather, canned fruit, etc. It first appears as little white patches; in three or four days the white patches grow larger and white tufts appear in the center. On the fifth day a bluish tint would appear on the tufts, which turns to an olive green on the eighth. If examined closely this olive green color is found to be due to a fine dust, and each particle of the dust is a spore, which upon a nourishing medium produces a new plant of *penicillium*. The spore grows in the following manner: At first it swells and a protrusion takes place from some part of its surface, and as this grows in length others appear from different parts of the surface and grow in all directions upon the substance upon which they rest. Each shoot branches and rebranches, and the only limit to their length is the lack of nourishment. When a colony of spores begin to grow, and their shoots interlace, a thick, tough membrane is formed called a mycelium, as is well illustrated by what is commonly called the mother of vinegar.

This mycelium plays a very important part in that class of fungi called peronosporæ, or parasitic fungi, and generally known as blights, mildews, smuts and rusts. The branches of the spore that form the mycelium are called hyphæ. Some hyphæ grow down into the liquid to obtain nourishment for the plant; others spread over the liquid, and part grow erect into the air for the purpose of reproduction. The reproduction by the erect hyphæ is not of a sexual nature, and is as follows: The erect hyphæ divides into three branches, and each one of these again divides into three. At the tips of these branches are formed the spores by simple abstriction, great numbers being formed from each branch. This is the rapid asexual reproduction that occurs under favorable circumstances. The sexual reproduction is seldom seen in *penicillium*, but is an interesting part of the life history of potato blight and the parasitic growths. *Penicillium* has been found in the udders of cows. The spores germinating in the milk caused several savants to put forward the doctrine of abiogenesis or spontaneous generation.

Potato blight is one of the most destructive of the peronosporæ, and is typical

of all the other blights, rusts and smuts. It will be of special interest at this time because of its recent ravages in Ireland. The mycelium of this plant penetrates the intercellular spaces of the interior of the leaf, root and tuber of the potato. The whole organism, no matter how far it spreads through the potato, consists of a single cell. At frequent intervals in its growth the mycelium puts out appendages which penetrate the cells of the host and empty the cells of their protoplasm. Reproduction takes place at the beginning of the development of the parasite, in a non-sexual way exclusively. A hyphae is projected through the pores of the plant to the exterior, when a large spore is abstricted in the manner of the moulds. This spore contains a number of motile forms, these escape from the spore when the spore reaches moisture. After swimming about for some time they settle down upon their victim and make their way into the intercellular spaces where they branch out into extensive myceliae. During the active stages of this plant's existence the asexual reproduction is carried on; but when seed are needed that will stand the cold and wet of winter the sexual method is resorted to. The sexual organs are developed in the interior of the tissue that the blight has invaded. Spherically dilated ends of branches of the mycelium shape themselves into male and female organs. The female organ has a part of its protoplasm separated from the rest as an egg. The male element is introduced into the egg by a sharp tube. After fertilization the female spore surrounds itself with two tough coats and becomes dormant during the winter. In the spring the spore swells, bursts its coats and lets loose numerous zoospores, like those from which the original plant was developed.

There is a mould that is particularly fatal to the fly in the autumn. A spore of the plant becomes attached to the abdomen of the fly, and soon sends a shoot beneath its skin, where a mycelium is formed that extends throughout the anatomy of the fly. If the fly dies while resting upon a window pane a white halo soon appears around him. This consists of the mould which has spread its mycelium upon the glass.

The potato blight and fly parasite are only examples of a large number of peronosporæ which affect animals and plants. The life history of all the different species is essentially the same; the variations are only minor ones caused by environment. An enumeration of a few of the evils they cause will not be out of place. The madura foot of India is a gangrenous condition brought about by the development of mould fungus through the tissues. Occasionally we find patients suffering from an ear filled with one of these growths, called aspergillius, which yields very slowly to treatment. Another of these organisms spreads great terror among the silk growers of France, for its devastations among the silk worms nearly extinguished the industry. The famine and ergotism that spurred rye and wheat have caused is well known. Among other diseases produced by the mould fungi are favus, tinea tonsurans, tinea sycosis, the salmon disease, a very destructive disease among fishes. Actinomyces or lumpjaw of cattle is supposed to be due to a fungus similar to the others mentioned.

The pathological significance of the moulds is of little importance as compared with the bacteria. The fact that they require abundance of oxygen and flourish at temperatures below that of the body, hinders their development within it. In tissues of an animal their growth and reproduction are much slower than in the case of the bacteria, for the reason that they do not usually find in the body their proper nutriment. The products of decomposition set up by them are by no means so poisonous as those which result from the development of bacteria.

There is still one more class of fungi called carposporæ. The individuals of

this group are the mushrooms, toadstools, lichens and allied forms. Their structure is the same as that of the moulds, and also their life history. If a toadstool is examined microscopically it will be found to consist of hyphæ aggregated together to form a stem and cap. The under side of the cap has rows of lamellæ radiating from the stem to the edge of the cap. These lamellæ consist of erect hyphæ joined together, and upon which the spores are borne. The variety in color that we find on the under side of the caps of different species of toadstools is due to the different colors of the spores.

In a very sketchy way I have tried to outline the classification of the fungi, bring out the characteristics of each group, illustrate the biological facts upon which the classification depends and dwell particularly upon those things interesting to medical men.

Dr. I. P. Klingensmith of Blairsville, Pa., followed with a paper entitled "Antiseptic Surgery in Railway Practice."

ANTISEPTIC SURGERY IN RAILWAY PRACTICE.

The topic about to be presented for your consideration is a much written subject, but to us, as surgeons, maintains such a position of interest as to stimulate our enthusiasm to renewed exertion and further investigation.

When the writer some sixteen years ago began the practice of his profession it was not uncommon to see operations followed by prolonged suppuration, erysipelas or pyæmia. The methods of treatment at that time were different and constantly changing, depending upon the convictions or whims of the surgeons. This conclusively goes to prove that all existing methods were more or less unsatisfactory and devoid of any underlying scientific basis. It is not a difficult matter to recall cases that ended fatally which under the present mode of wound treatment would have recovered, and lives were lost which should not even have been imperiled. Within the last few years a great change has occurred. The principles of antiseptic surgery as originated by Sir Joseph Lister have now become firmly established, creating the personified surgery of to-day, which makes it in the eyes of the world almost an exact science, rearing a wonderful structure of successful progress.

Its methods are simple, accurate and certain. To observe the contrast it is but necessary for a moment to glance at the simple dressings of to-day, applicable to all the varying conditions of modern surgery, regardless of location, with the multitudinous formulæ varying with the location of each disease or injury. It is unnecessary to further follow the argument in advocating a principle which has made its impression upon the world and revolutionized the surgical art. The crowning achievement of modern aseptic and antiseptic surgery being its certainty of result, therefore we, more especially as railway surgeons, should not be oblivious to the legal responsibility involved, but give our patients the benefit of antiseptic treatment.

Justice Tyndall declares that undertaking to practice a profession is the assumption of an obligation which, though implied, has at the same time all the force and validity of a formal contract; and Stephen Smith says that the maxims of aseptic and antiseptic surgery have been so generally approved and adopted by surgical authorities that they must now be regarded as established principles of practice. Hence if a surgeon fails to apply these principles with reasonable care he may justly be held responsible for unfavorable results which modern methods of treatment would have prevented.

My preceptor, the late Prof. S. W. Gross, has said: "As to aseptic surgery I can only say that if anyone has been taught the modern methods and neglects

them and death occurs from erysipelas, pyæmia or septic complications he cannot be held irresponsible." My own opinion is in accord with these views, for I consider the surgeon who does not practice in conformity with the principles of modern surgery a dangerous man in a community who should be held up to public scorn and condemnation and have no right to practice surgery.

A well-arranged emergency bag containing the most necessary articles for the management of cases of accidental surgery will well repay the small expense and trouble. An operating bag which, during the last three years has proven highly satisfactory to myself, consists of what is known as a "cabin bag," sixteen inches long, having a stout strap sewed to each side of the interior of the bag, so as to form loops for the necessary bottles which will then be held safely in the upright position. The loops will be occupied by a half-pound tin can of ether, a two-ounce bottle of chloroform, a four-ounce bottle of carbolic acid, a bottle containing catgut of different sizes on spools, another containing silk of different sizes on spools, a bottle containing drainage tubes, a bottle containing sponges, a bottle containing corrosive sublimate tablets; also, iodoform duster. The bag also contains a stout pair of scissors for cutting dressings, a forceps for the anæsthetizer, a razor, nail brush and all necessary surgical dressings. The instruments are rolled up in a white linen pouch, which, when soiled, can readily be duplicated. The bag also contains a fountain syringe, at least half a dozen towels, three small tin basins and such other accessories as may be indicated for any special operation. The hand bag rests in a nest of two oblong tin pans which are secured in position by means of straps. The same straps also hold in place on the outside of one side a piece of white rubber sheeting one and one-fourth yard square. Considered from the economical standpoint you may think that this is not a cheap method of dressing wounds. As regards the first cost, this may be true; but if you consider the saving of bandages alone—of one dressing in two or more weeks—over daily dressings, you will see that it is far less expensive than the former plan, to leave out of consideration the time of the surgeon or the feelings of the patient.

When the better results and lessened mortality are taken into account we look upon the expense as but trifling and that the antiseptic method is worth all the trouble that it costs to attain such results. To sum up briefly, my practice is to carry out absolute cleanliness on the part of myself and assistants, cleanliness of the patient, instruments and dressings and the use of antiseptic solutions. The time, in fact, has arrived when instead of meeting criticism by argument we are able simply to point to accomplished facts. Therefore to illustrate more fully what can be accomplished by antiseptic methods I will briefly refer to two cases of compound fracture. The first is that of a brakeman who had been thrown from the top of a box car upon the track. Upon examination I found a compound fracture of left leg in middle third involving tibia and fibula, with extensive infiltration of tissues, lacerated wound of right ankle, lacerated wound of metatarso-phalangeal articulation and numerous other minor wounds and contusions. The grave feature of the case, as it presented itself, was the compound fracture which, if treated in the old way, would have necessitated amputation—in fact the temptation to amputate was great, but having faith in antiseptic measures I decided to make the effort to save the limb. After thoroughly scrubbing, shaving and finally cleansing with bichloride solution a sublimated gauze dressing was applied and the leg placed in a fracture box. The progress throughout was quite satisfactory and after a period of ten months the patient was able to resume his occupation as a brakeman.

The second case is also that of a brakeman who, while in the act of making a coupling, had his left elbow joint caught between the "deadwoods," producing a

compound fracture, with such extensive laceration of the soft parts as, in fact, to expose almost the entire mechanism of the joint. Under antiseptic treatment at the end of about thirteen months he was able to resume his former occupation with but slight stiffening of the joint.

These cases are not selected for the occasion, but are such as ordinarily occur in railway practice. Under the beneficent influence of modern aseptic and antiseptic surgery we may safely say that amputations are not much less frequent now than formerly and there is little doubt that in the present rapid advance in the science of surgery and the greater perfection in its art, the time is not far distant when amputation for other cause than gangrene will be comparatively rare.

DR. U. C. LYNDE, BUFFALO, N. Y.—I have listened to the paper with a good deal of interest. The writer has taken a position generally that few surgeons of the present day would try to contradict. I wish to make a few remarks concerning what was accomplished before antiseptic surgery was practiced in this city. I will confine myself to this city and state and railway practice, and when I say railway practice I am not speaking without some knowledge of the subject which I obtained from my acquaintances and from the surgeons of this city.

Seven years ago I read a paper on the severest kind of railroad accidents—double and triple synchronous amputations of the upper and lower extremities. In preparing that paper I wrote to from 3,000 to 4,000 physicians in the state of New York, to nearly every doctor in the city of Buffalo, Rochester, Albany, Syracuse and similar cities, and to 500 in the cities of New York and Brooklyn. I received a very general answer. I addressed them with a few printed questions. The answers varied a little, but they answered the purpose of my paper. That I might not be deceived with regard to results, I followed up the answers, whether favorable or unfavorable, by further inquiry, wherever they were remarkable. I not only followed them by making further inquiry of my professional brothers of the same town, but in some instances I visited the cities myself, visited the profession and exacted from one surgeon who had the best results in these terrible and serious railway accidents photographs of his patients. That was Dr. LeRoy McLean. He had made six amputations for railroad injuries. The paper I have referred to was published in the Transactions of the New York State Medical Association in the year 1884. I learned that there had been up to that date 100 double synchronous amputations, and but few of them were for railroad injuries. It is highly probable that of the terrible accidental cases in this state, nineteen-twentieths of them are produced by the railroads—the cause of the injuries you are investigating to-day and which you have traveled, some of you, nearly 2,000 miles to consider. Out of

those 100 cases there was not a false report sent to me so far as I could ascertain. Frank Hamilton once said to Dr. Hyde, when reading a paper on dislocations of the hip, that he could not tell anything about the truthfulness of the replies he received in consulting doctors over the state. As I have before stated, I visited several cities for the purpose of establishing the truthfulness of some of the reports I had received.

To come back to the statistics of LeRoy McLean, who had made six double synchronous amputations—of these six cases five recovered. When I started to prepare my paper I thought I had made more double synchronous amputations than any man in the state. I had made four such amputations, three of which recovered. I also made one triple amputation, which recovered. In these eleven cases Listerism—I will not say antiseptic surgery, because that would not be fair—was not practiced in a single case. I am not here, gentlemen, to say anything against the practice of antiseptic surgery, but I do wish to state that the best of all antiseptic surgery is clean water and soap applied to cases of accidental surgery. While it will do well to have all of the paraphernalia with you, and especially if you are going to make an incision yourself, yet suppose you are going to remove a tumor, you wash the part and all of the surrounding surfaces with soap and water, you scrub it with a solution of corrosive sublimate, and all that manner of thing; that is aseptic surgery. Here is a man, let us suppose, that is run over by car wheels, dragged along in the dust and mud, dirt and grease, and finally carted or taken to some place until the surgeon arrives. When you reach him what is his condition? Of course if one of the lower extremities is injured, and it is above the knee and you are going to make an amputation, you can practice your aseptic surgery, because you will go through sound tissue. It is a matter of little consequence if you go above the knee or foot, as the case may be. Suppose you are trying to save a big toe or one of the fingers, and you have got the soft parts cleaved from the bone, and the bone is exposed to as many germs as the locality furnishes, and yet you have some sound tissue there; by utilizing that you can save a portion of the joint. If you make your amputation below that joint your finger is going to stick out by the side of the little muscles of the phalanges; you must utilize that portion which is full of life, and you can do it if you try, but you cannot apply your aseptic surgery to it. Let us suppose, again, that you have a hand terribly mangled, and it has been exposed in the manner indicated, and the wound is filled with extraneous matter or with germs; you make an effort to save what you can of it but you cannot apply your aseptic surgery. You put

your patient under chloroform, wash it and even scrape the surface with your knife, treat it and dress it properly; that is all you can do.

I wish to say a few words regarding the case of compound fracture of the leg—I think the doctor said in the middle third between the knee and ankle. The compound fracture would have made amputation necessary. The son of Geo. A. Moore of this city had his team run away from him. He was so injured that the tibia and fibula ran through his pantaloons. He was covered with mud when I arrived. I cleaned the tibia and fibula, washed out the wound the best I could, enlarged it, washed out and scraped the surfaces, etc. I returned the tibia and fibula; I placed sand bags on each side of the leg, covered with a pillow on either side. He was out and around in four weeks. Not one drop of suppuration took place. That was one of the most remarkable cases I ever saw.

So far as the doctor's case of fracture is concerned, necessitating amputation, I will say that the results in former times, before antiseptic surgery was practiced, were as good as they are to-day. I have seen other cases than that to which I have referred that never suppurated. I have seen them get out in two or three months and others in six months.

With regard to railway surgery, as I have before stated, aseptic surgery cannot be applied to it to the letter. If you are going to make an amputation, to sacrifice a foot, you may just as well sacrifice the parts a little above it as it leaves a better chance for a false foot. If you sacrifice only an inch above you can scrape the parts and cover them with corrosive sublimate, you can practice aseptic surgery in such a case; but nine-tenths of your cases are beyond the power of practicing aseptic surgery on. It is out of the question.

With regard to compound dislocations of the elbow, I sent Dr. E. M. Moore a case thirteen or fourteen years ago complicated with comminuted fracture in a young man. With proper treatment the patient did well.

With regard to dislocations accompanied with fracture of the astragalus and malleoli, I have seen them frequently.

In reference to sacrificing a foot, whether to do so or to jeopardize the patient's life, I will say that you jeopardize the patient's life less by an amputation; you can practice aseptic surgery, but if you perform resection of the bones you cannot carry it out to the letter.

I had no idea what position the author of the paper would take, therefore I have very little to say in the way of criticising what he has said beyond this, that it is beyond the power of surgeons to practice aseptic surgery to the letter; and so far as antiseptic surgery is

concerned it has been proven—and I think our friend, Dr. Koch, has come to that conclusion by this time—that in living tissue filled with bacteria the organisms cannot be killed without killing the living tissue. If we have a case in which there are specific germs introduced and doing their work there is nothing, in my judgment, that will kill them, whether you use corrosive sublimate, carbolic acid, eucalyptus, or anything else.

DR. WILLIS P. KING OF KANSAS CITY, MO.—I feel glad to be permitted to speak on this subject at the present time, and more especially to follow the gentleman who has just spoken, because in many respects—in fact in almost every respect—I shall disagree with him. I become more and more convinced the longer I remain in the East that we will have to invite these eastern gentlemen to come West to get light. I am inclined to believe that the sun rises in the west and not in the east. [Laughter.] I have had the advantage somewhat that the boy's father had. The boy said that "honesty is the best policy," because Pap had tried both. I had been engaged in the practice of railway surgery for ten years before I used antiseptics at all. For six years I have been using antiseptics, and I have had the privilege and the opportunity in my practice to distinguish the difference between the time when I practiced without antiseptics and the present time, and I must say that my experience will not bear out the assertions of the gentleman who has just spoken; nor will my experience bear out his statement that we cannot apply antiseptic and aseptic surgery in railway practice, because if he will come West and visit the Missouri Pacific hospitals where we try to use antiseptics to the best advantage, where we try to use everything the best way possible for cleanliness, not simply physical cleanliness, but chemical, surgical cleanliness, where we have crushed feet, crushed hands, crushed arms and legs, crushed heads, lacerations, contusions, and everything of that nature, he will see cases that go along for weeks and months without a drop of pus. You can take all the pus we have in these hospitals, except in an accidental case, and put it in your eye. [Laughter and applause.] I know what the practice was and know what the results were in times gone by. I had accidental cases, I had compound fractures where I had amputations to do, and by some kind of supervising Providence (I do not think it was owing to me or my method of treatment) my cases did not get poisoned and didn't die, and the fact that they did not die does not prove anything. In those days I had lots of pus and now I have little or none. Now, there is something in aseptic and antiseptic surgery. The microscope has led the way in these investigations, and



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it has been a "light unto our feet" and has shown us the way to walk. The microscope has been scientifically exact in these matters. The investigations of Sternberg and others in bacteriology are so scientifically exact that I am astounded to hear anybody stand up in Buffalo to-day and say there is nothing in aseptic and antiseptic surgery.

As far as the paper is concerned, I have had a number of cases come under my observation such as were detailed by the author. I desire to compliment him upon his very excellent paper. He applied the best treatment. Our experience now in such cases is not what it was ten or fifteen years ago, because we know that if we failed to amputate a hand or to lop off a foot—in 70 per cent. of the cases we did not do it there would be septicæmia and death. Now, we take these cases and with conservative processes, using antiseptics, save them. I cannot tell you, gentlemen, unless I had my books here, how many cases have been brought to me where my best local surgeons on the railroad years ago would have made amputations. They felt that if a leg were not amputated the patient would certainly die. We use corrosive sublimate 1-3,000; we enlarge the wounds, removing all spicula of bone, having our antiseptic solution streaming into the tissues; we wire the larger pieces of bone together, washing and permeating the tissues everywhere, and by these means we get our patients in a condition in which they get well afterward without any pus, with proper and through drainage. With this kind of drainage you get rid of the surplus serum which is thrown off in the healing process, and at the end of five or six months perhaps the case has recovered and the man is ready to go on the road again. Fifteen years ago I would have taken such limbs off with a knife and saw.

I have three cases on record where two car wheels went over an arm and shoulder. It seems almost incredible, and I would be ashamed to mention it except in the presence of men who know about these things. I removed handfuls of bone, opened up the wound and found muscles in the small openings protruding here and there. These three men are going about the world to-day with good arms. Three out of four cases had a double compound fracture of the humerus; one of the four had a single compound fracture complicated by being broken into the joint. This patient has a stiff elbow, but a good arm. Two out of three have good motion. Ten or fifteen years ago I could not have expected such a thing as this. Dr. Outten has had the same experience in the same locality with similar wounds. I admit that there is a great deal in clean water and soap, and it is a pity there is not

more of it used for simply physical cleanliness. But even with soap and water there may something get into your wound which will in time kill your patient. I do not understand why some gentlemen will persist at this late day and say that there is very little benefit to be derived from the aseptic and antiseptic treatment of wounds, when the facts establish the contrary. I would not for any consideration go back to where I was ten years ago in the use of these things. My experience is altogether different, and it is delightful to any man who has studied the subject thoroughly.

Carbolic acid is not worth anything as an antiseptic. We never pretend to use it. Anything which will take the epithelium off of my hands in a 5 per cent. solution and not kill bacteria in a 10 per cent. solution is not, in my judgment, a safe antiseptic. We use corrosive sublimate, as I have said before, in 1-3,000.

The illustration drawn from Dr. Koch does not apply in these cases at all—that you cannot kill bacteria without destroying the tissues.

I went to New York six years ago this spring for the purpose of studying this subject. I went home and prepared a paper for the Missouri State Medical Association on the subject. I was unable to attend the meeting myself, so I sent my paper by one of the house surgeons, and some of the members of that association, metaphorically speaking, mopped the floor with my paper, and I believe if I had been there they would have hanged me. [Applause and laughter.] The following year I was there in person, and the year following they began to accept more and more the views I advanced, so that to-day it has spread all over that state. We have shown the value of the antiseptic treatment by reporting successful cases.

DR. SAMUEL BIRDSALL OF SUSQUEHANNA, PA.—I have listened with great interest and pleasure as well as profit to the paper that has been read upon this very interesting subject. Being invited to take part in this discussion, I think I am excusable for writing down some of the thoughts which I shall present, because, like others in my profession, we do not always feel like speaking without some preparation, and therefore it is an advantage to have what we intend to say in writing. What I have prepared has been done very hastily—necessarily so, and I am glad to notice that it will not duplicate anything that has been previously said upon the subject.

The first speaker advocates strongly antiseptic methods; the second is in doubt about their value, or leads us to infer that they are somewhat impracticable, and not of that value which we have supposed them to possess. The third speaker pointed out the advantages

of antiseptics in strong terms, and he has evidently had ample experience, more, perhaps, than I can claim in their use. The principal object of what I have to say is to point out some of the advantages of the antiseptic methods and to show you that they are simple, practicable, and can be applied by the railway surgeon as well as by others.

The treatment of wounds at the present time, according to the oldest teachings of science, is a very different procedure from what it was as late as ten years ago. The past decade marks an epoch in the practice of medicine and surgery; excepting the period embracing the discovery of the circulation of the blood by Harvey, in addition to the use of the silk ligature for the arrest of hemorrhage and the discovery of vaccination by Jener, the past decade stands unparalleled in the history of medicine for the progress and improvements made. In no department of medicine or surgery has the change been greater or the improvement more marked than in the treatment of wounds. When it was discovered that years ago the healing of wounds was retarded by complications such as erysipelas and blood poisoning produced by certain germs, called diseased germs, gaining access to wounds, the foundation was laid for the change to which I have referred. Great as are the advantages resulting from what is known as the antiseptic method of treating wounds, I have some reason to think that there are quite a number of surgeons who have not adopted it, or at least not with that degree of thoroughness which is essential to success. Although I am fully convinced of the immense value of antiseptic treatment, I do not wish to be too severe in my criticisms of those who have not as yet adopted it. I am well aware there are important reasons that have influenced some. The first antiseptic method and dressings were so complicated as to be difficult to the general practitioner, therefore, after reading a description of them, he would naturally conclude that such treatment was impracticable for him and would not be adopted in hospitals where every facility was not at hand. Another reason hindering the general adoption of this system is the fact that it is only since 1886 that there has been a text book on surgery in which it is taught. The majority of surgeons engaged in railway practice graduated more than ten years ago when there were no text books on antiseptic surgery, and it is not strange that many good surgeons have not familiarized themselves with its details. Whatever cause or circumstance led to the adoption of antiseptic methods, it is certain that ignorance and prejudice on the part of conservative physicians have not appeared among them. This, I think, is highly creditable to the scientific spirit of the medical profession of the present day. It proves conclusively that the so-called school of medicine is not required to

accomplish another needed reform in medical or surgical practice. The true scientific physician accepts the dictates of science whether in accordance with his professional opinion or not; hence the adoption of antiseptic methods in surgery, like many recent improvements in medical and surgical practice, has been rapid. Among the advantages of this practice may be mentioned the more rapid healing of wounds, diminished liability to erysipelas, inflammation, suppuration and blood poisoning; also, as might be expected, diminished mortality. Statistics are not needed to prove its superiority over former methods: a brief trial is all that is required to convince the most conservative of surgeons.

At the risk of being tedious to some of the members present to whom details of antiseptic methods are familiar, let us describe my method of using antiseptic solutions and dressings in the treatment of wounds, and especially in operations. What are called dry antiseptic dressings are applicable only to incised wounds; contused and lacerated wounds, where there is danger of sloughing, must be treated with moist dressings, but such wounds should be freed from diseased germs by thorough irrigation with a 1-2,000 or 1-3,000 solution of bichloride of mercury. The carbolized spray, so strongly recommended and used heretofore, is now considered unnecessary and can be dispensed with. In preparing for an operation I have not the advantages of a hospital like many of you gentlemen here; I am deprived of the advantages which such institutions afford for carrying out the process of antiseptics. I believe it is easy; I find it so, at least, to practice antiseptic surgery, even if I am obliged to treat my patient in a dusty room in the top of a boarding house or hotel, or at his residence. I find it easy to carry out these principles, and first, whatever I use for a table for my instruments or dressings, I endeavor to secure a clean surface. This is easily done. Put down a clean spread or a piece of muslin or common towel, then you have a clean surface for your dressings and for your instruments. I have not yet abandoned the carbolic acid solution for the instruments. My instruments are immersed in a 3 per cent. carbolic acid solution and my irrigator filled with 1-2,000 bichloride of mercury. This is the strength which I have hitherto used; and then I make sure that my hands are thoroughly cleansed and rendered aseptic. The part to be operated upon is thoroughly cleansed and irrigated; then during the operation irrigation is needed; when the wound is about to be closed it is irrigated so as to free it entirely from germs, and the very last thing before placing the dressing in position is to irrigate with 1-2,000 bichloride of mercury. I have no doubt surgeons differ in their methods of carry-

ing out the antiseptic practice, and differ considerably in applying dressings. The wound is covered with iodoform powder or aristol powder, thoroughly covered, this being dusted upon it. Then you put on from six to eight thicknesses of iodoform gauze; then we have from eight to sixteen layers of bichloride gauze, which I prefer to have recently moistened, but in case you have hemorrhage to contend with it is desirable to use it dry; then you have a thick layer of bichloride cotton, and lastly your bandage. We have not only freed the wound from diseased germs by the bichloride solution, by the antiseptic dressing, but these germs are effectually blocked out; they cannot gain access to the wound. When I first began to study antiseptic surgery I was led to believe that it was very desirable to change the dressings. Now these dressings can be left from five to ten days before removal; there is very little or no suppuration or inflammation; they do not need to be changed. Let the first dressing remain five days, after that seven or eight days, so that in the progress of healing of the wound after amputation of an arm we have to change dressings about three times. There is no harm or danger in changing dressings when you can so readily irrigate the wound and clean out any diseased germs that might have accidentally found access to the wound; then reapply your dressings in the same manner.

I should have said that I use drainage tubes of various sizes to drain the wound, and the antiseptic dressings not only prevent the entrance of diseased germs, but they absorb what serum and blood oozes from the wound, and they are extremely useful in that respect.

DR. R. HARVEY REED, MANSFIELD, O.—It seems to me we have come to an age when every progressive railroad surgeon is ready and willing to adopt aseptic and antiseptic surgery. There was a time when the people who lived before Columbus questioned whether there was an America. Now we have an America and an American Association of Railway Surgeons. The question whether antiseptic or aseptic surgery is beneficial to railroads or to any person who requires an operation is, it seems to me, an obsolete question. I have held for years that it is advantageous to railroads in the matter of economy—decidedly so, to say nothing about the comfort of the patient. When a railroad accident occurs and a man is injured it is of advantage to the railroad to get that man well in the shortest space of time, to give him as little pain as possible, and to get him at work as early as possible; that is the object of antiseptic surgery. Instead of having the man lie around with an amputated leg for six or eight weeks, dressing him daily, with pus streaming over the bed as we used to have it, and the man taking the chances of septicæmia and

pyæmia, we get him out in less than half the time with little or no pus. I have amputated above the knee and my patient would be out on the street within three weeks, wound entirely healed, without pus. Can you do that without antiseptic surgery? Is there a surgeon present who can get such results, one case after another, without pus according to the old method of treating wounds, without antiseptics? I tell you, gentlemen, it was not done, it could not be done, and when it was done it was an exception to the rule.

I remember a few years ago when a student hearing Dr. Agnew of Philadelphia, one of the leading surgeons of the day, say in the presence of 500 students that it was utterly impossible to have union by first intention. Does any man believe that to-day? Dr. Agnew himself does not believe it now. Were you to ask him that question to-day he would tell you yes; but not without the aid of asepsis or antiseptics.

A few years ago, when the American Surgical Association met in Cincinnati, Dr. Watson of Jersey City stood up before that distinguished body of surgeons and read a paper on Listerism. There were very few members present who did not oppose the views he advanced, and among those present were such men as Gross, Pancoast, Connor, Moore and many other prominent surgeons of our country. What do they think of modern Listerism to-day? There is not a single member of that association, to my knowledge, but believes in modern Listerism or antiseptic surgery. The whole system of practical surgery has been revolutionized; all prominent surgeons have long since discarded the old theories and views they once held. In a conversation with Dr. Senn a short time ago, he said that one of the hardest things in this age was to know what to discard and what to retain. Surgery is wonderfully progressive; it is going on wheels as rapidly as the trains on the railroads we represent. What were considered reliable text books ten years ago are no longer guides for us to-day, except in a few of the fundamental principles. Our text books are changing; our methods of treatment are constantly changing, and it is antiseptic surgery that is sweeping the whole field.

Dr. King said that in Missouri they metaphorically mopped up the floor with his paper on antiseptic surgery, and I am not surprised at it. Only a few years ago in one of our district societies in Ohio they did the same thing with a paper that I read on antiseptics. The older surgeons said that my views were the teachings of an old woman and laughed and hooted at the idea. Antiseptic surgery has not only revolutionized railway surgery, but it has revolutionized abdominal surgery. We never could do the work we do to-day

without it; under the old methods of treatment it would have been simply impossible.

Before I close I desire to call your attention to one more point—a point I had intended to say more about than I will, and that is antiseptic surgery considered from a financial point of view. We should use it on every railroad, for by carrying it out we will save our railroad companies thousands of dollars annually and at the same time add untold comfort and safety to our patients.

DR. LYNDE—I desire to say a word in defense of what I had previously stated. The gentleman who followed me thought he was opposing me. He was not. I did not come here to say that antiseptic surgery and aseptic surgery had not revolutionized the hospitals of this country, for they have. The doctor says we should come West as the sun rises there, he was inclined to think, yet the doctor acknowledges that he had to come to New York to learn this.

DR. KING—Do you boil your water?

DR. LYNDE—No, sir; I never boil it.

A MEMBER—Did you have any elevation of temperature in your cases?

DR. LYNDE—Some of them may have had a chill.

DR. S. C. BENEDICT OF ATHENS, GA., said he did not expect to participate in the subject under consideration, but when antiseptic surgery was assailed he was compelled to say something. He was gratified to know that those men who had not graduated under the teachings of antiseptics had become converts to it.

A year ago at the Georgia State Medical Association the speaker read a paper on "*Antiseptic versus Aseptic Surgery*." In the discussion the argument was made that Mr. Tait did not use antiseptic surgery, but that he was an aseptic man. He boiled his water and boiled his instruments and used every possible precaution in the way of cleanliness, but did not use germicides. The answer made by some gentlemen in New York was that he used magnesium sulphate after every operation as soon as he saw the temperature beginning to be elevated; that by its use it prevented absorption from the peritoneal cavity on account of the action that it has.

The speaker had learned what antiseptic surgery was from his own experience and the instruction he had received from Wyeth, Gerster and others. He had worked it out himself, and the results he had obtained since he had been practicing it have astonished him. There was no question in his mind but that the use of germicides was absolutely essential to successful results in surgery.

DR. BENEDICT then reported at length two or three interesting

cases, showing the successful results that may be accomplished by strict asepsis and antiseptis.

DR. J. H. MURPHY, ST. PAUL, MINN., said that some of the members has talked so much about antiseptic surgery that Dr. King hardly knew what it was to see pus. The only difference between the distinguished gentleman from Buffalo (Dr. Lynde) and Dr. King was that the former did not call everything antiseptic surgery, but was a firm believer in cleanliness, which was about the same as antiseptis. He believed their results were about the same. He arose for the express purpose of drawing the two men together.

DR. S. S. THORN, TOLEDO, O.—In the remarks made by the preceding gentlemen on this paper there are some things I wish to take exceptions to. I want to have this talk about the responsibility falling upon surgeons because of a failure in their efforts sometimes to bring about successful results stopped. We as railway surgeons should be the last ones to charge insufficiency of effort or attention to any man who fails in obtaining a successful result in the treatment of a case. I have two men at the present time lying in St. Vincent's Hospital in Toledo, and the wounds in both of these cases are discharging pus in spite of my efforts to prevent it.

I caught the gist of the argument in favor of aseptic and antiseptic surgery. I take it that we mean by antiseptic surgery the sterilization of parts already contaminated. In injuries and contusions chemical appliances are valuable; they are necessary. I will briefly refer to a case that came under my observation a short time ago in which asepsis and antiseptis were carried out to the best of our ability.

A boy, fourteen years of age, after exposure had inflammation of the periosteum of the left tibia and the embarrassing fact in the case was that the disease encroached upon the nutrient artery, interfering with the circulation; hence there was necrosis in that portion of bone. We cleaned out the suppurating cavity and gouged out as far as we could every particle of dead bone clear up to and almost involving the cartilage of the head of the tibia, my line of gouging extending down to a narrow point into the lower third, and the wall was so soft as to permit the collapsing of the limb under the operation. We endeavored to sterilize this cavity. I used the unpardonable strength of a solution of corrosive sublimate of 1 to 500; I have no doubt that this almost takes your breath away. We sterilized the cavity until we felt that we had gotten beyond all contamination and had removed all the contaminated tissue, then we closed in what portion of the periosteum was remaining, brought the tissues over as far as we could and closed



VICE-PRESIDENT GRANVILLE P. CONN, A. M., M. D., CONCORD, N. H.

the wound up, using of course antiseptic dressings, covering these over with dry dressings. We then removed the Esmarch bandage and allowed the cavity to fill up with blood. I instructed the nurse to keep the limb elevated to prevent as far as possible an excess of blood to the part. I saw the patient again in the evening and the following morning. The dressings were blood stained throughout. Under careful antiseptic precautions these were removed (that is, the dressings), and were reapplied. The large amount of blood distended the cavity. The next day I removed the outer dressing; at the end of fourteen days the dressing was removed and the parts were practically healed. One more dressing was applied and that was all that was done.

Here is an illustration of the effect of chemical sterilization and what can be accomplished by antiseptics. The limb solidified under these dressings without the cavity being in any way disturbed, and the boy is now walking about and has been playing baseball for weeks.

I have presented this one case to illustrate the value of antiseptics, which is worth, I take it, a thousand negatives or more.

Dr. Galbraith then reported a "Remarkable Case of High Temperature."

A nominating committee was appointed as follows:

George Ross, Richmand, Va., chairman.

Charles P. Cole, Helena, Mont.

W. B. Lawrence, Batesville, Ark.

R. S. Toombs, Greenville, Miss.

W. B. Rogers, Memphis, Tenn.

B. F. Eads, Marshall, Tex.

B. L. Hovey, Rochester, N. Y.

Dr. R. Harvey Reed of Mansfield, O., made a motion providing for the election to honorary membership in the association of general managers and superintendents of railroads, etc.

After some discussion, participated in by Drs. Cole, Stemen, King, Outten and Reed, the motion was carried.

Secretary Lewis moved that the list of names for honorary membership be referred to the executive committee and that this committee report to the association. Carried.

The association adjourned to meet at 8 P. M.

EVENING SESSION.

The association reconvened at 8 P. M. and was called to order by Dr. G. P. Conn of Concord, N. H., vice-president.

The paper of Dr. S. L. McCurdy of Dennison, O., was passed, owing to the author's absence. *

Dr. Conn then read a paper on "Hygiene of Railway Cars."

HYGIENIC CONDITION OF PASSENGER CARS.

The problem of securing fairly good hygienic conditions in railway passenger cars is one that presents more complications than almost any other question connected with the transportation of passengers. From thirty to sixty people, representing different ages and physical conditions, having tickets of the same class, ride from one hour to two or three days in coaches having but little ventilation and becoming more and more filthy with each succeeding day. These people will have variable mental and intellectual powers, from the helpless infant to the crank who seems to study how to make everybody uncomfortable; and as the hygienic conditions become worse and worse on account of the accumulating dust, cinders and other refuse matter, as well as a more disgusting condition of the closets, the women and children are obliged to endure and suffer far more than the men, for the reason that they are more strictly confined to the car, the men more generally going into the open air every time the train makes a few moments' stop.

When we take into consideration the hygienic conditions that generally exist in an ordinary passenger coach that is used for a continuous journey of from 500 to 1,500 miles, it should not excite surprise that by the time their destination is reached the people are disgusted with their accommodations and are suffering with headaches, and perhaps nausea. It is true that passengers are more or less responsible for the general want of cleanliness in the car, for very many good people seem to forget themselves when journeying and permit their children, and even allow themselves, to throw upon the floor of the car nutshells, banana and orange peels, crumbs and remnants of lunches. In warm weather these refuse matters will in a short period render the atmosphere of a coach almost unbearable to a sensitive stomach, and the effect upon the nervous system is very depressing.

Parlor and sleeping cars, under the care of a special conductor and porter, are not allowed to remain very long in an uncleanly condition, yet it is not very infrequent that the closets of these coaches become very disgusting when making unusually long runs.

It is the common first and second class coach that makes a continuous run of one, two or three days which attracts attention, and when we find the condition of the floor and closet untidy and unclean, and combined with this an atmosphere saturated with the products of respiration and perspiration, we have those unwholesome factors that serve to render most people extremely uncomfortable and positively unhappy.

It would not seem necessary that a car running only an hour or two and then remaining upon a side track for half a day should become offensive, yet in a service of this kind it is not infrequent in hot weather to find the odor of the closet pervading the whole car, and that too after it has been swept and dusted; no one seemed to have remembered to examine into the condition of the closet.

* The paper by Dr. McCurdy is published in Appendix E.

These may be said to represent some of the many conditions that are far from being hygienic in their character.

The first question to be discussed must in general terms deal with the subject as a whole, viz.: Is it possible to make the necessary improvements without at the same time making such radical changes in the management of trains as seriously to inconvenience the traveling public? In the early history of railroads interchange of cars and great through lines had not been developed. The lines were short and passengers did not feel that it was a hardship to change from one car to another. Even with such delays so much better time as well as comfort in traveling was experienced that everyone was well satisfied. Now long, continuous journeys in the same coach have found favor with the public, and the management of our roads have made every effort to meet the popular demand. Much of this through travel is in parlor or sleeping cars, palatial in their appointments, and which, as I have said, are taken care of much better than the ordinary coach.

Still we find that trunk lines in meeting the demand for through transportation are obliged to place in through trains first and second-class coaches, and everyone is familiar with the advertisements of such lines—that they are running first and second class as well as palace cars to some great railway center or to the coast as a distinguishing feature of their line over some other route that requires frequent changes from one train to another. This may be cited as one of the first of the many obstacles to be overcome in the solution of the hygienic problem, as a run of one, two or three days may and probably will show very great changes in temperature, especially if the journey be from north to south or southwest, or vice versa; therefore the conditions affecting heating and ventilation must be constantly changing.

Then again, coaches running over several roads may be subjected to considerable changes in speed; therefore the atmospheric pressure on the outside of the car will be changed, as the atmospheric pressure on the outside of a car moving at a rate of thirty-five or forty miles an hour is radically different from what it would be if that coach were running twenty miles an hour. This may seem a very small matter, but when we reflect upon the conditions and remember that a great amount of fresh air is forced into a car by reason of this atmospheric pressure it will be seen that it really constitutes an important factor in the ventilation of a coach under our present system of construction of passenger cars.

With the thermometer 20 or 30 degrees below zero one does not need to sit beside a car window very long before he will realize that a great deal of cold air is finding its way into the space around him, and almost everyone has some time passed through a section filled with smoke from brush fires or old ties, and has realized how nearly instantaneously the odor will penetrate the car. It appears to me that this feature of air finding its way into a car through every opening crack is the salvation of the traveler during cold weather, when people will sacrifice fresh air for heat and therefore close the ventilators, as they are called in the roof of the coach, and, so far as they can, hermetically seal the car. Were it not for the fact that air is forced into the coach by reason of the atmospheric pressure, and that trainmen and others are passing in and out at every station, thereby keeping the doors in motion, I am not sure but passengers would, in the coldest weather, die from the depression caused by the polluted atmosphere. As it is they remain sometimes for hours in an atmosphere rendered impure from the respiratory products of all sorts of people, some of whom may have serious forms of diseases, and it is one of the immutable laws of health that a system loaded with

disease germs or depressed by contaminated air or polluted water has less resistance to the invasion of disease and less ability to throw off any premonitory symptoms of ill health than one who has pure air to breathe and pure water to drink.

In this connection I would add that while there are a great many patent designs offered to the management of our railroads for ventilating cars, none as yet have proven so satisfactory as to be universally adopted. It is but an act of justice to add that many roads have spent a great deal of time and money in experimenting with designs that seemed, theoretically, to be of some account, but nothing has yet stood the test of practical work under all conditions, like the air brake or some of the other mechanical means of improving the train service or rendering it relatively safer or more economical.

Many of the devices have good points and under certain favorable circumstances will bring about results that justify us in predicting more positive improvements in the near future. It is too much to expect any system to be effective at all times, as the conditions vary so widely between a car in motion and one standing still at a station that anyone system cannot be of use except as provided for.

Now while we may hope to secure improvements in heating and ventilation, let us give a moment's attention to some method that might reasonably be expected to improve that department of the service which is known as car cleaning. As now conducted in the eastern states there is some one at points where cars are sent out or remain over night who is supposed to have jurisdiction over the work, employs the help, keeps their time, etc. At some large railroad centers the work is contracted and the contractor receives a stated sum per car and employs his own help. I do not know of any road in New England that employs a person who has given special thought to the work or who might be considered as an expert in such matters; therefore there is little if any system, each workman doing his or her work in a routine if not in a perfunctory manner.

Frequently cars are required for use almost immediately, and one or more boys are raising a dust with their brooms before the passengers are fairly out of the coach. In such instances all that is done is to clear the floors of the most prominent portions of dirt and cinders, no attention being given to the closet. Can this order be changed without interfering with the practical working of the trains? I believe it can; but in order to bring about practical results it may be necessary to educate the practical railroad man into the mysteries of what constitutes a hygienic car.

Sanitarians, while experts in the hygiene of dwellings, grounds, cars, etc., are very liable to be very much too theoretical on matters pertaining to an active train service to assume dictation over conditions only understood by practical railroad men. A happy combination of the practical and the theoretical should be brought out, developed and thoroughly tested under the varied conditions ordinarily found upon all lines of roads before any radical change should be recommended, for it is only by a general adoption of some practical and economical system by all roads having an interchange of rolling stock that an improvement can reasonably be expected.

The management of train service has a vital interest in this question, for an intelligent public is becoming more and more critical upon matters that may affect the health of themselves or their families. People traveling for business or pleasure across the continent or from the lakes to the gulf pay the transportation lines whatever may be the tariff at the time, but they reserve the right to criticise the hygienic condition of the cars as well as the want of politeness of the em-

ploye. It is generally well understood that want of politeness of an employe is an unprofitable investment in advertising, and an unclean coach will not pay any better dividend.

In general terms what is needed is thorough instruction of the employes whose duty it is to take care of the cars, as well as to instruct the trainmen that something can be done by them to keep a coach clean when on the road. Frequent inspections should be made, certainly at the end of every division service, by some one so well informed about the service as to detect at a glance any slighting of the work at the place where the coach was last cleaned, and who should report the same at once. The responsibility should be placed and the employe corrected, the same as if he had been guilty of slighting a piece of mechanical work that would endanger the lives of passengers.

It has been found necessary to employ men to look over the trains at frequent intervals, and those men become very expert in detecting a cracked wheel, a journal that has lost its true alignment, a bolt on which a nut is missing or a brake that is insufficient. Such service may seem humble and the passenger may scarcely notice the person as he quietly passes around the train, yet his work is invaluable and you never hear any complaints from passengers when an order is received from the quiet man to vacate the car, as it is not safe to run it any further. Everyone from the highest to the lowest accepts his ultimatum and without question makes arrangements to carry out his order.

I have seen coaches so filthy that someone should have the power to substitute a clean, well-ventilated car for the unclean one. How coaches shall be made clean is a problem of no small proportions, as we have shown that only a limited time can be allowed, and therefore to do good work modern conveniences and mechanical ingenuity must be substituted in part for the manual labor now generally employed. Hot water and steam are our best disinfectants, deodorizers and filth destroyers. It is also a well-known fact that surfaces superheated with dry or moist heat become dried and free from the odors of moist surfaces very much sooner than the same surface would if wet with cold water, which in cold weather is of great importance, as a car reeking with moisture incident to a washing in cold weather is about as uncomfortable and unhealthy an apartment as can be found.

Whether it will be necessary to bring all coaches that require cleansing within a reasonable distance of a stationary engine in order to utilize steam from its boiler I will leave to the practical railroad man; yet I will venture the suggestion that the same result might be attained by attaching a hose to any locomotive near at hand and which was not to be sent out for an hour or two. To carry a jet of steam into a urinal for a few moments dissolves all the salts deposited upon its surface, and the introduction of steam under twenty-five or fifty pounds' pressure in the corners and crevices of a closet for a moment will destroy the most virulent germ that may be lurking there. How it shall be brought about is only a question to be settled by practical mechanics.

I am not making any claims to originality in this paper, but am rather striving to make the most of what may be found in any railroad yard. Let us use reason in all things, and while these are matters that may seem humble when compared with some brilliant act of modern antiseptic surgery, yet the public are just as much interested in its success as they are hopeful that they will not need our services as surgeons. Now as the public becomes interested we may be sure the management of our roads will not be far behind in their expectations that we will take cognizance of this work, for it is to us they will look for suggestions. While

we are looking after the lives and limbs of the employes we should also have a thought for the health and happiness of the passengers.

DR. R. HARVEY REED, MANSFIELD, O.—The paper presented by Dr. Conn is one of exceptional qualities. We have had very few papers presented to us on this particular subject. He has dealt with the subject in an able manner, and it is one of considerable importance to railway surgeons. The important point, however, is how shall we put it into practice—the ventilation, heating and sanitary cleaning of railway cars? It is less than four years since I made an inspection of the passenger coaches on four different roads. I made or had made an analysis of the air, I inspected the closets, urinals, wash stands, water tanks and the various departments of the car and I can only corroborate every word Dr. Conn has said in his paper as being absolutely true. The only trouble in the matter is we do not realize the extremely bad condition of some railway coaches. For example—and you will pardon me for referring to it—I found a baby's diaper in a drinking water tank. I could give you the name of the road and number of the car if necessary. In the car in which this accident occurred the water tank was placed inside the water closet, and somebody had gone in there and thrown the article into the drinking tank. That form of water tank has since been abandoned. Some of the railroads fill their water tanks from the top of the car, by which they can be easily filled, but they are hard to clean out. I dare say some of these tanks have not been cleaned out for a year. From ten to thirty minutes is given to change engines at a station. The employe jumps on top of the car, runs water into the tank, throws in three or four chunks of ice and the train goes. This occurs daily throughout the year. Nobody looks after this matter particularly, consequently it is only rational that when you inspect these tanks they are found absolutely filthy, notwithstanding the fact that the water is clear and may be perfectly cold.

Another point. Take the water that is supplied by the different railroads, and not one road out of a hundred has its drinking water analyzed or knows what kind of water it is giving to its passengers. I do not believe the railroads intend to be negligent in this regard; I don't believe they have had their attention called to it. I found in analyzing some of the waters that they were absolutely unfit for use; other waters were fairly good, and others moderately good. This is the sanitary part of the work of a railroad. Somebody should attend to this matter, and see that the water tanks are clean and that the water poured into them is fit for use. In the ladies' department I found that about 95 per cent. of the water closets were clean, while in

the gentlemen's department, if I remember correctly, about 37 or 38 per cent. of the water closets were filthy. There is a reason for this, and that is the mode of construction of these water closets. In the ladies' water closet you are bound to have them clean if properly cared for, as there is no place for dirt to lurk. On the other hand in the gentlemen's department there are no means of keeping the urinal clean except you force hot water or steam through it. There are very few of them but have an offensive odor during the summer time. Something should be done to avoid this, as it can easily be accomplished without any additional expense worth mentioning.

The cleaning of cars is of great importance. One has only to watch how hurriedly they clean the cars day in and day out. Dr. Conn has not drawn the picture strong enough for you, because the work is done in a very hasty manner. Take the average class of people who do this, they know nothing about such work from a sanitary standpoint and care less for it; they do a certain amount of work each day, for which they are paid a stipulated price, which ends their interest or anxiety. Again, there are very few railroads but carry weekly to different parts of the country people sick with contagious diseases. There are a great many physicians who are not conscientious about these matters and permit such people to impose on the railroads. They allow scarlet fever and diphtheria or some other contagious or infectious disease to travel which ought to be quarantined. A case was recently taken from Chicago to Zanesville, where an epidemic of diphtheria broke out. The physician in Chicago either did not make a correct diagnosis or evaded the facts and the results were disastrous. Railroads do not carry these cases intentionally, yet occasionally—almost every month I may say—there is scarcely a railroad but carries some person or persons with contagious diseases, such as measles, scarlet fever, etc., and yet there are no provisions to-day for cleaning these cars and putting them in a condition so that your children and my children can ride in them with safety. There ought to be some rigid restrictions, first in regard to carrying these cases and second there should be some method by which the cars could be put and kept in a sanitary condition. I simply throw out these hints in order to elicit some general interest in the matter, because a few of us have been working for years on this matter and have accomplished thus far but little.

There is one other point I desire to touch upon, and that is the ventilation of cars. There are several different methods for ventilating cars, yet few of them at the present day are ventilated as they should be. The question in regard to carbonic acid in the car is one

of importance. I found by analysis that carbonic acid in Pullman cars was higher than in the smoking car. That may seem strange to you, but it is nevertheless a fact. The Pullman car starts out with a car-load of passengers in New York and few changes are made from there to Chicago. People ride with the car virtually closed and the ventilation is poor. The result is that when you go into the car in the morning you find fifteen or eighteen parts of carbon dioxide to 10,000 parts of air, whereas there should not be over five. On the other hand in the smoking car somebody is constantly going in and coming out, consequently you will only find about five or six parts of carbon dioxide in 10,000 parts in the smoker on the same train.

There should be some system adopted for the ventilation of these cars whereby the bad air can be driven out and fresh air let in. In regard to the temperature, the lowest I found in any car during cold weather was 12 degrees between the mouth and feet and the highest was 30 degrees. When you get a temperature varying from 15 to 30 degrees between the feet and the mouth, to say nothing about the variations in the temperature in the car higher up, you can readily understand how liable you are to catch cold. The cars referred to were heated with steam pipes at the floor, yet there was still this difference. In a series of 224 analyses, made in reference to the amount of carbonic acid at the top and floor of a given room, the results were surprising; in fact there was practically no difference between them; that is, where you have a circulation of air and everything else equal the carbonic acid is practically the same at the ceiling as at the floor. You must substitute a system of heating and ventilation that will overcome the pressure as you pass through the air. When the car is in motion you have a strong air pressure in front of the car, consequently when it is standing still it changes the currents of air inside. If you desire to heat and ventilate cars properly you must take into consideration all these facts. You have got to produce a current of warm, fresh air that will come in at the floor and exhaust the foul air at the floor in order to get the car heated and ventilated equally all over. If you do that there is no necessity of having your windows or transoms open, and you would not have 10 degrees difference between your feet and the ceiling of the car; there would be an equal distribution of heat all over the car from one end to the other, and you would not have an increase of carbonic acid over the ordinary amount.

We cannot impress the importance of this matter upon the public and railroad managers too much. A vice-president of one of the leading railroads not long since said to me: "If you gentlemen of the National Association of Railway Surgeons can devise some plan by



VICE-PRESIDENT B. L. HOVEY, M. D., ROCHESTER, N. Y.

which we can heat and ventilate our cars to better advantage you will do more for the traveling public than any one thing you can do." There are 15,000,000 of people moving on wheels or boats every twenty-four hours in this great country, and considering this fact it is worth our while to pay attention to this subject. It is worth our while to endeavor to remedy these defects and to give better accommodations than there are given at present, especially when it can be done without any material additional expense to the railway companies.

DR. C. B. STEMEN, FORT WAYNE, IND.—I shall not take up the time of the association in discussing the merits of the paper. I desire simply to say that I am grateful, and I believe the members of the association are likewise, to Dr. Conn for the valuable paper he has read this evening. I desire to say for the encouragement of Dr. Conn and the members of the association that copies of the paper read by him at the meeting in Kansas City last year, and which was published in the *Journal*, were sent to a large number of railroad managers, and some to London and even to Belgium, and notwithstanding that we had to reprint thousands more, which were also distributed and have been exhausted.

In order that railway managers may improve the unsanitary condition of the coaches for the traveling public they must rely first upon sanitarians to offer suggestions and to devise means whereby it can be done. The question, however, is a complex one. We have found it so. I am very glad Dr. Conn has been further pursuing this subject. His contribution is certainly of value to every member of the association, to the traveling public and to the railway managers of this country at large. I realize the difficulty that railway managers have had in cleansing their coaches, and you all know that they are not penurious but are ready and willing to spend any amount of money for the purpose of cleaning their cars and having them in as good a sanitary condition as possible. The important question is, how is it to be done? There have been more time and money spent upon this than any other subject. It is not the fault of railways or the managers; they try to have their coaches in the best condition. The fault lies largely with us in not calling their attention to these things. It is gratifying to know that on some of the roads improvements have been and are being made in this direction, especially on the Wabash and the Missouri Pacific, and I may say on the Pennsylvania lines. The Pullman coaches that run from Chicago to New York and New York to Chicago every twenty-four hours you will find in as good condition as it is possible to find them on any road represented here by the surgeons of this association.

What Dr. Reed has said in regard to the filthy condition of the atmosphere is true, and we find that in our homes, in public halls and places of amusement. The subject of ventilation and of sanitary science is one of the greatest subjects that is now engaging the minds of the medical profession, and if there are any members here who have given it special study we certainly shall be glad to hear from them.

DR. WILLIS P. KING, KANSAS CITY, MO.—I do not rise for the purpose of taking part in the discussion of this important and interesting subject, but I simply wish to criticise one of the statements made by Dr. Reed for the benefit of truth and science, and that is in regard to one-quarter of this population being on railway cars every twenty-four hours. It cannot be true. Somebody has misled him. It is out of the question that one out of every four in this country is on railroad cars daily. The gentleman who compiled the statistics must be in error.

DR. W. B. OUTTEN, ST. LOUIS—I want to speak on the subject of railway sanitation from a practical standpoint and on the score of economy. There is a conception on the part of railway managers that the relative cost for the sanitation of cars on each railway system would be excessive. For instance I can give you from practical experience the actual cost of such a plan, projected upon the basis that we had existing at one time. We organized a department for running a hospital; during that year there were twelve hundred stations inspected; every section house, every station, every water closet and all the various water supplies, etc., and in every case as far as the unsanitary condition of buildings is concerned, the cost was only \$296 to the railway company for disinfectants used. What I maintain is this, that with a well-organized department, or local departments, the relative cost for sanitary purposes is so small that upon investigation of the same there is hardly a railroad manager who would not accede to the idea and follow out the plans that may be suggested. On this point I am thoroughly convinced that any man of ordinary sense can readily see the danger arising from the use of water from questionable sources. An analysis should be made of the quantity of organic matter contained in the water. This should be done on all occasions. If our railroad managers could only see their way to adopt sanitation on their different railroads I am confident they would be benefited by it.

Dr. Outten here explained his method of ventilation of cars by means of illustrations on the blackboard. He closed by referring to water closets. He maintained that the present position of water

closets in railroad cars is a mistake. Of all places it should be in the center of the car. In its present position (at the end of the car) it courts stench and unhygienic conditions.

DR. R. HARVEY REED—I will say in reply to Dr. King that my authority for the statement I made is Mr. C. T. Aubin, a civil engineer of New York, who was employed by the Chilian government to look up the statistics of the number of people that traveled on railway cars, street cars, ferry boats and vessels of various kinds in this country, and his report shows that in New York City alone 500,000 people move to and fro daily on wheels and 15,000,000 of people in the United States of America traveled on railway trains, street cars, ferry boats, etc., every twenty-four hours. Of course this does not apply so much to the country; it applies more particularly to our large cities where large numbers of people travel to and from their business daily.

DR. G. P. CONN, CONCORD, N. H.—In regard to Dr. Reed's figures we must take into consideration the fact that in our large cities a great many passengers are counted several times in a day. That makes a great many over and above what it would be if each person were only counted once. However, be that as it may, we know that a large number of people are constantly moving from place to place and their life is one half seemingly spent on the cars.

In regard to Dr. Outten's plans for ventilating cars, I purposely left out designs in my paper, as I believe that anything I might add in that direction would be theoretical, and many of the devices I have tried myself have come to naught. Before we can accomplish anything in this direction we must combine practice with theory and bring out and develop something new.

I will say that while at Charleston last fall, at a meeting of the American Public Health Association, we were invited by a north-eastern road to take a trip of about twenty miles on a car fitted up by a Mr. Emerson. The car was of new design in the way of ventilation. Its action was satisfactory for a short distance, and I am not prepared to say that it would not be for a long distance. It was simple in its character, and I will try to describe it. First of all there was a turning of wheels, there were two fans connected with the axle, connecting in opposite directions, one forcing the air in and the other out. The air before passing in was passed through some kind of a strainer. It was very satisfactory, as I have said, for a short distance. It was a dusty day when they took us out. The tubes through which the air was brought in were left open, or rather the valves were open to their fullest extent, so that a handkerchief would not stay a moment in the vicinity of it, nor any cinders. How long that same car would run

along before becoming clogged with cinders, not allowing the air to pass in before becoming saturated, I am not prepared to say.

I had some experience once with what is called the Ober system. Our road established a line which runs to the White Mountains, where they carry many people during the summer, and they have placed it in all their parlor cars. The inventor put it into one car and tested it while there was snow upon the ground and it worked admirably. As soon as the weather became warm and dusty it would fill the car so full of dust that you could hardly stay in it. At Charleston we were shown an apparatus for cleansing cars. A lot of waste material was saturated with oil and then lit; making an abominable stench, and in five minutes by means of this apparatus the stench was cleaned out. The demonstration was good, and we were told that it was so simple that it could be applied to any ordinary car for less than \$150, so that it is a comparatively inexpensive apparatus. I was told that the man who exhibited the apparatus was going to fit up a better car, that he was going to Boston next summer, and I told him that I hoped he would go there, as the railway commissioners of New Hampshire and Massachusetts are making a study of these things in connection with sanitarians. We have a class of people passing through the eastern states during the summer months that is hardly known in a good many sections of the country; they come from the north and south, and both sanitarians and railway managers are doing all they can to make the journeys of these summer travelers as pleasant as possible.

The meeting then adjourned to Friday morning, May 1, at 10 o'clock.



SECOND DAY.

The meeting reassembled at 10 A. M. of Friday, May 1, the president in the chair.

The president announced the name of Dr. Galbraith of Omaha on the nominating committee in the place of Dr. B. L. Hovey of Rochester, who had resigned.

Mr. Charles Truax of Chicagoread a paper on "Amputations in the Light of Prosthetic Science."

AMPUTATIONS IN THE LIGHT OF PROTHETICAL SCIENCE.

Within a comparatively short space of time prosthetic science has advanced to that state of perfection where, with but few exceptions, if the surgeon leaves a patient who is a cripple as the result of an amputation of one or both of the lower extremities, it is because he has either operated in an unskillful manner or selected his point of amputation without regard for the mechanism necessary in the construction of a properly fitting compensative appliance. It is not many years since all who were so unfortunate as to lose even a single limb were considered as wholly or partially helpless—crippled for life. To-day there are thousands of men, women and children who, although they have suffered amputation of one or both of their lower limbs, are enabled, by means of artificial appliances, to walk our streets and attend to their various duties and vocations, moving with such an easy step that they would consider it an insult to be referred to as cripples.

I therefore hold that the surgeon who unnecessarily leaves his patient in such condition that artificial assistance must be imperfect and unsatisfactory is guilty of gross incompetence and criminal negligence, even if he be skilled in his methods of amputation and able to show a low rate of mortality. Surgeons should come to a full understanding of the relations between the stumps remaining after amputation and the appliances likely to be worn upon them, for while it is a fearful thing to lose a limb, it is much more fearful to be rendered a life-long cripple and to suffer the discomforts and inconveniences resulting from the lack of proper judgment on the part of the operator.

The progress of prosthetic art renders it necessary to readjust former methods of surgical procedure, that the rules and maxims which govern the latter may conform to the advancing and consequently changing condition of the former.

It is useless for the more enlightened surgeons of the day to argue that statements like these are unwarranted (and hence that no changes are necessary), for it is the fact that quite a percentage of the cases who annually seek the services of makers of artificial limbs bear unmistakable evidence of careless or bungling operating or the exercise of poor judgment in the selection of the point of amputation.

I do not hold that all the work turned out by artificial limb makers is faultless, but I do claim that under favorable circumstances the better class of them can construct limbs that give the wearer as little discomfort as a glove, shoe or well-fitting set of artificial teeth.

Gross evidently realized this, for he said (and I quote from his "System of Surgery," page 546):

There is reason to believe that the inconveniences and sufferings occasioned by the use of

artificial limbs is more frequently attributable to the misconduct of the surgeon than to the want of skill on the part of the manufacturer of the substitute.

This to you may seem a strong and perhaps doubtful assertion, but my own experience bears testimony to the truthfulness of every word of the statement.

The Golden Rule, usually practiced in amputations, has been to save every possible ounce of bone and tissue consistent with the safety of the life of the patient; and to appreciate how rigidly this has been adhered to one has but to examine into the various, yet similar, tarsal operations, no one of which possesses much advantage over the others; yet each (and their number is legion) bears the name of the surgeon who gave it birth or prominence.

With scarcely an exception this is the teaching of our standard text books to-day, and as a result our surgeons frequently perform harmful operations that should have been relegated to the misty past long years ago, dispelled by the light of a more advanced and humane system of surgery.

Athurst, Bryant, Hamilton, Roberts, Wyeth, and a host of others more or less prominent as authors, lay great stress on this Golden Rule, or as they term it, the first essential principle, which, they say, is to *save all of the maimed or diseased limb possible*. Bryant, in speaking of tarsal operations in particular, says to do different from this is *almost criminal*; while Wyeth, in referring to ankle operations, says an effort to save the greatest possible portion of the foot is justifiable, *even at the risk of a secondary operation*.

In the days when artificial limbs were of an inferior grade to those manufactured at the present time, when the resources of the instrument maker were much less than they are to-day, and when limbs were controlled largely by patents, and consequently much more expensive than now, there might have been a valid excuse for discriminating between the stumps of the rich and the poor. But to-day, when a high grade of limb can be secured with at least a five years' guarantee as to its durability, at a cost of about seventy-five dollars (this covering a period of five years), or not to exceed an average yearly expense of about fifteen dollars, no cause remains for such discrimination. So that to-day the thoughtful surgeon, in every instance, may select his point of amputation with a view to assisting the instrument maker in constructing the best possible artificial substitute, *even if in so doing he sacrifice considerable bone and tissue that might under former methods have been permitted to remain*.

Stephen Smith, differing with the balance of our standard authorities (with a single exception, to which I will call your attention later), says:

The point of amputation should not, in all cases, be the one that is farthest from the trunk, and when an amputation nearer the trunk will give a better stump, the danger of the wound is not so much greater generally as to forbid the slightly increased risk for the life-long advantage gained and surgeons who are not qualified to select the proper point of amputation, or form a well-shaped stump, have already been judicially condemned.

Dr. J. B. Murdock in a recent article states:

It is as important to know where to amputate as how to perform the operation.

The proper method to be adopted in operating is a question that is hardly germane to the subject before us to-day. This must be selected to suit the requirements of each individual case. Teale's rectangular flap method, however, ought never to be followed, except in amputations in the upper third of either the tibia or femur, and then when the tissues are torn and lacerated upon one side only. In such cases Teale's operation may be resorted to if an additional length of stump, which will be of value to the patient, can be saved, and it is not recommended under any other circumstances.

This amputation leaves a double cicatrix on the sides of the stump—the very

points upon which we produce pressure. This alone is enough to condemn it, to say nothing of the time and care required to trace the lines of incisions, the unnecessary amount of bone frequently sacrificed and the deep-seated condition of the wound caused by the thickness of the flaps, thus retarding granulation and inducing sup-puration.

With this exception I see no marked advantage or disadvantage in any of the other flap methods, whether solid, skin or mixed. The lines of incision and formation of the flap should, however, be such that the cicatrix will be underneath and to one side of the end of the stump, as it will be less liable to be sensitive if followed by contraction or other complications. If formed posterior to the end of the bone there will be no danger of irritation when wearing a substitute, because in swinging an artificial limb most if not all the pressure caused by forcing the limb forward is taken on the anterior aspect of the stump.

Great care should be exercised, in all cases when amputations are made in the continuity of the limb, to see that the end of the bone is well rounded or smoothed at its outer border, particularly on its anterior edge.

Until a substitute is worn the stump should be kept well bandaged from above downward to prevent undue retraction. This bandaging also promotes absorption of redundant material and prevents the formation of adipose tissue. Some form of massage treatment should be applied to the stump daily in order to retain the normal sense and activity of the muscles, and also to harden the integument, thus decreasing its sensibility and lessening its liability to excoriation.

Before entering into a discussion of the principles most important in a good stump I desire to call attention to an erroneous impression regarding the wearing of artificial limbs that exists in the minds of many surgeons. This is to the effect that in most cases following amputation of the lower extremity the weight of the patient, or at least a great portion of it, is borne upon the end of the stump. It is true that this follows after some operations, but it is the exception and not the rule. Bryant, Ransohoff in the "National Hand Book of the Medical Sciences," and in fact most authors, advise the forming of flaps so that they will bear pressure, thus creating the impression that this is necessary in all cases. The general tendency of such teaching is misleading and can only result in frequently influencing a surgeon to modify his operation in order that it may fulfill these supposed requirements. Whether or not these modifications are advantageous to the best interests of the patient will be better understood after we have discussed the special amputations to which they may apply. The facts are that in operations in the continuity of the leg the weight is in every case borne by cone-shaped sockets, employing the same principle as would be used if one were to grasp the limb of a friend below the calf with both hands and attempt to lift him from the floor.

When a section has been made through a bone no weight can be borne on the end of the stump. Disarticulations and osteoplastic operations alone will admit of pressure.

If we can believe the statements of English makers of artificial limbs this principle is not understood or utilized to any great extent in the old world. Heather Bigg, an English authority on this subject, states that in fitting artificial legs there are really but two points that afford bearings of any utility—the heel and the ischium. He emphasizes this by saying, that in all operations at points higher than the ankle joint the bearing of the artificial limb should be entirely taken on the very top of the thigh, and more particularly on the ischial tuberosity or sitting bone, and that it is *absolutely imperative* to make all such limbs reach the pelvis. This statement, I am free to say, is untrue, as I shall presently demonstrate. There

are to-day thousands of patients who are wearing legs, designed by Yankee inventors, where not even an ounce of weight is borne either by the end of the stump or the ischio-perineal region.

The requirements of a good stump are: sufficient length to provide leverage with which to swing an artificial limb, proper covering for the end of the bone (not too thick, however,) cicatrix underneath and to one side (preferably posterior), and in shape like a gradually decreasing cone, with a well-rounded outline and free from uneven surfaces. *If for locomotion, it must conform in length to the necessary mechanism of an artificial limb and possess the firmness necessary to bear the contact with the socket in order that both the natural and artificial parts may move and be operated as one.* These principles are of vital importance, and the lack of a proper understanding of them has caused many an otherwise brilliant surgeon to leave an occasional patient unnecessarily crippled.

The surgeon should bear in mind that artificial limbs have members and joints corresponding as closely as may be in length, form and motion to the natural ones, and that as the latter can only be operated by means of certain necessary anatomical mechanism, the interference with which impairs or wholly destroys its value, so also the artificial substitute must depend upon its mechanism if it successfully fulfills the demands made upon it.

The action of the natural leg while being used for locomotion is largely automatic, being operated principally by the muscles of the pelvis, directed by what may be termed muscular sense, those of the leg and foot being mostly employed for special uses and as stays or supports to keep the leg steady.

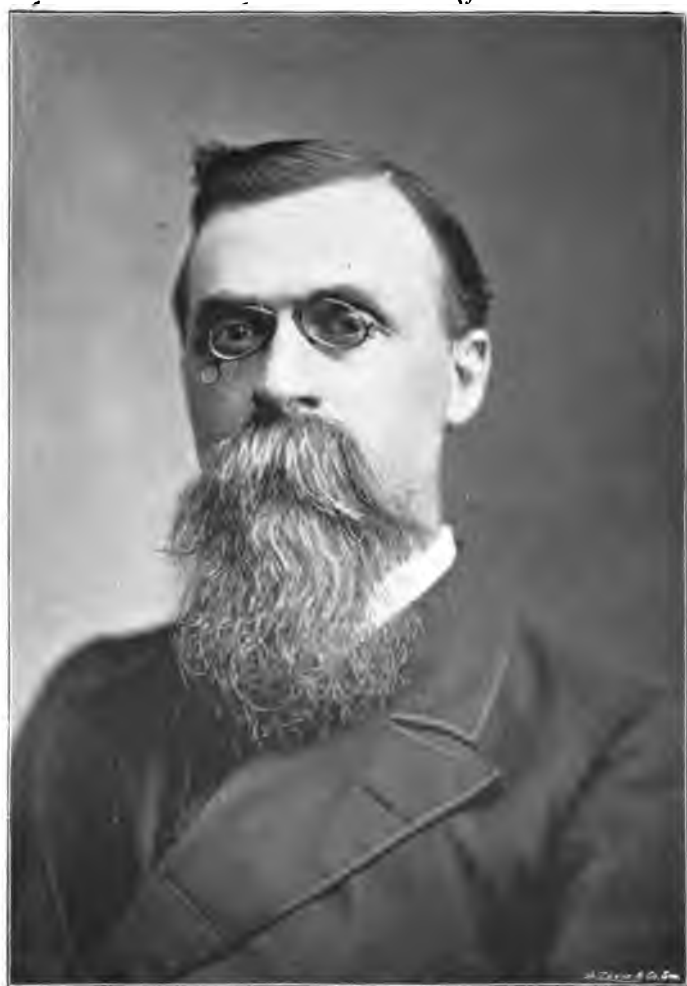
In the simple act of walking there is but little force generated other than in such muscles upon the pelvis as have their insertion in the upper portion of the thigh, and consequently in the construction of artificial limbs we practically have only the automatic or mechanical action to deal with and imitate.

For instance, the natural hip joint is of the ball and socket pattern, yet following amputations in this joint we construct serviceable substitutes with monaxial movements only.

The natural knee joint is not only monaxial but is automatically self-locking, because the bearings of the ends of the bones forming this joint are posterior to a line drawn perpendicularly through the shafts of the tibia and femur. The result of this is that the weight of the body, when the leg is fully extended, naturally maintains this position, while over-extension is prevented by the tightening of the lateral and posterior ligaments. Flexion of the femur upon the body and flexion of the knee are produced simultaneously and by the action of the same muscles. Following these flexions the foot from a state of rest though not at first moving with the same relative rate of speed as the upper portion of the tibia quickly acquires an accelerated motion and gains a momentum of sufficient velocity to carry its limb to complete extension of the knee, where, as before stated, it becomes self-locking. These movements being largely of an automatic nature, we have only to understand them and a limb can be made that will have practically the same action and do nearly the same work.

This automatic action can be closely imitated in the leg for the simple reason that, except in hip amputations or those immediately below it, the muscles of the pelvis and thigh are left intact and capable of performing their natural functions.

Artificial limb makers have taken advantage of this and have reproduced, as far as possible, this simple automatic action. The result has been that thousands of people wear these appliances who mingle in society for years without their acquaintances coming to a full knowledge of their maimed condition.



VICE-PRESIDENT GEORGE ROSS, M. D., RICHMOND, VA.

The artificial limb is swung forward by the action of the muscles of the pelvis and thigh; the knee bends automatically as it raises; the lower leg moves forward until it locks, while the foot accommodates itself to any inequalities of the ground. As soon as the body passes over the active limb and the latter begins to point obliquely backward, the slack of the false tendo-achilles is taken up and the ankle becomes at once rigid, thus causing the wearer to rise on the ball of the foot and assist in propelling the body forward.

After an amputation has been decided upon—whether for the purpose of prolonging life from impending danger, to remove a cause of suffering, or to relieve a source of inconvenience, it matters not—the first thing essential is to *select that point for the operation that will afford the greatest possible use of the stump to the patient.* This is the new axiom—a tru(e) ax-*iom*, if you please—which I wish to see substituted for the old one, the so-called Golden Rule.

In performing an amputation that will best serve the interests of the patient, all superfluous and useless bone and tissue *should be removed*, that it may be replaced by artificial material that will be of service and of value; and in discussing operations in various portions of the body, I shall assume this to be one of the most important principles to be considered.

Since the almost universal adoption of asepticism, pyæmia, septicæmia and kindred complications are seldom met with it, the result being that the rate of mortality has fallen so low that it presents no barrier to the general adoption of this rule.

Since the discovery and use of anæsthetics, as ample time is given in amputating, it admits of taking the greatest advantage for the patient, and it is, therefore, possible to exercise greater forethought and better judgment than under former methods.

Owing to the different service required of an artificial arm, as compared with the leg, it follows that the rules that should govern the surgeon in amputating, in the one case, do not apply to the other.

In a stump for prehensile purposes as many articulations should be preserved as possible, remembering that a single finger, or *even a portion of one*, is of far greater value to the patient than a whole artificial hand.

In operations in the hand the surgeon would be justified in assuming the risks of a secondary operation, providing there is a reasonable chance in so doing, of saving an additional part of this most valuable member. As Dr. McHatton of Macon, Ga., has well said:

It is far more creditable to the surgeon to have saved even a portion of a finger than to have amputated a dozen whole ones.

Further, there are many cases of injuries of the arm and forearm, necessitating great loss of muscular tissue and sections of bone, and possibly resulting in immobilized joints, yet if carefully treated, the limb, though badly crippled, may be preserved and prove of much more service to the patient than the best substitute ever made.

An artificial arm invariably presents an unsightly and unlikeliest appearance, which, with its awkward, rigid form and general helplessness is always a source of discomfort and annoyance.

In amputations of the hip and middle and upper third of the femur, the old Golden Rule should be strictly adhered to and every inch of bone that can properly be covered should be saved. The weight, in these cases, is borne by the cone shape of the stump and by pressure on the ischio-perineal region.

The socket here shown will give a fair idea of the methods usually employed

to distribute the weight of the patient, in this class of cases, over the greatest possible amount of surface.

Thigh stumps are almost invariably cone shaped, and, if of reasonably firm tissue, much pressure can be borne by them, thus relieving in part the weight to be carried by direct contact with the pelvis. It will readily be seen that the longer the stump the less the amount of antero-posterior or lost motion, and, therefore, the more quickly and the more perfectly the substituted part will respond to the action of the natural portion.

The two sections of sockets here shown, although for amputation of the lower leg, will, I think, fully demonstrate this point as each exhibits two extremes—one shaped to fit a very long, and the other a very short stump. This one, if applied to a long stump, would move and act in perfect unison with the remaining portion of the natural leg. This, the other form, owing to its limited bearing surface, would permit of more or less antero-posterior motion of the stump within the socket, and consequently, in walking, the artificial part would not move forward simultaneous with the natural portion, neither could it be checked as quickly if in motion, in case a full extension of the knee was not desired.

In attempting to secure a long stump, however, the surgeon should avoid operating at a point less than three inches from the lower articular surface of the



FIG. 1.

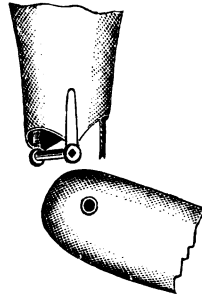


FIG. 2.

femur, or he will interfere with the mechanism necessary in the most satisfactory form of artificial knee joint.

Before taking up any portion of my subject that refers to amputations in and about the knee and ankle joints, I desire to first call your attention to the two forms of joint irons or hinges, either one of which, as here shown, or some modified form, it is necessary to use in all knee and most ankle joints. This, the first one (Fig. 1), is the ordinary rule joint, so called because of its resemblance to a carpenter's pocket rule. If properly made it has no lateral motion and is constructed with a stop that will allow it to flex in one direction only.

Its disadvantages consist in its limited bearing surface, and the fact that it cannot be made with a bushing. Those of you who are acquainted with mechanics will readily understand that two steel faces bearing upon each other, as these do, will soon wear away the bearing portion of the joint so that it will become loose and rickety, particularly if compelled to carry a weight. This, the second or cylindrical form (Fig. 2), not only presents a much greater bearing surface, but, owing to its construction, it can be made with a brass or leather bushing, thus

reducing the amount of friction and lessening the liability to get out of repair. An English authority gives the wearing value of these two joints, one to the other, as one to forty-three; this, however, I consider somewhat exaggerated.

Artificial limbs, in which the cylindrical form of joint are used, are not only more durable, but they are lighter than when constructed with the rule joint. This one (Fig. 3), manufactured wholly from English willow, and designed for an amputation of the femur, has cylindrical joints, weighs but three pounds and six ounces, and is capable of sustaining a weight of 200 pounds and upward, and that, too, on the ball of the foot, while the limb is inclined obliquely backward. The larger sizes of this form, weighing not to exceed one pound more, will carry weights varying from 300 to 400 pounds without danger of breaking.

This limb (Fig. 4), constructed for an amputation below the knee, shows the rule form of joint with lacer attached. These joints are made of varying weights

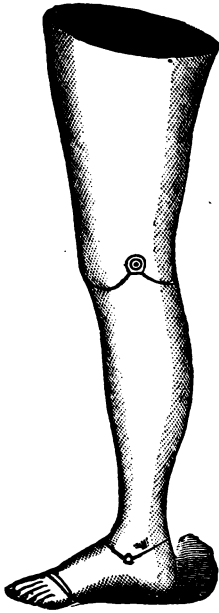


FIG. 3.



FIG. 4.

and sizes, depending on the service required of them. If simply as stays or supports for the leg in amputations in the tibia they may be made light, so that the weight of the limb need not be increased more than from four to eight ounces; but if designed for operations in or near the knee or ankle joints they should be of heavier material (because compelled to carry all, or nearly all, of the weight of the patient), thus increasing the total weight of the limb to from four to five pounds. These differences in weight may seem insignificant to you, but I assure you they are of vast importance to the patient.

The first form shown you we are compelled to use in all cases where an amputation has been made through the joint, or so near to it as to leave no room for the second one. The first form is a source of frequent expense, provided it is compelled to carry a weight, and must occasionally be replaced. The latter, with now and then a new bushing, will wear from ten to twenty-five years.

In amputations in and about the knee, it is well to remember that artificial limbs, constructed for operations made *at least three inches above the joint*, afford a greater degree of satisfaction to the patient than when manufactured for an amputation in the contiguity of the limb.

The objections to knee joint disarticulations are more in favor of economy and durability than otherwise, because this class of cases necessitate using the rule joints previously referred to. Such a limb, while it may fit well, will not prove as durable as one in which the long cylindrical joint is used, and it will, therefore, be out of repair at least a portion of the time, and require more or less expense to keep it in order.

If, however, in the opinion of the surgeon, the risk of life be greater because of operating nearer the trunk and opening of the medullary canal (as compared with amputating in the knee joint), the advantages to be gained by an operation at the higher point are not sufficient to warrant an increased rate of mortality.

If the amputation be made just below the knee joint contraction and flexion usually follows; the patient uses control of the stump, and is then obliged to resort to an old-fashioned knee-bearing leg, one in which the weight is taken on the anterior aspect of the flexed limb.

Notwithstanding the teachings of many of our standard authors to the contrary, limbs of this class are awkward, clumsy appliances, affording but little satisfaction to those unfortunate enough to be compelled to wear them.

Cardens' condyloidal and Grittis' supracondyloidal operations afford much better shaped stumps than simple disarticulations, for not only is the stump shorter, thus admitting of better mechanism in the knee joint, but a more conical shape results.

Judging from a mechanical standpoint, the ideal knee operation and point of selection would be *three inches above the joint*. This affords the patient every advantage gained in an operation in the contiguity of the limb, while it permits the use of a substitute that will seldom be out of order and practically cost nothing to keep in repair.

In making amputations in the continuity of the tibia, the point of selection should be at the junction of the lower and middle thirds. This leaves space enough underneath the end of the stump for the placing of joints of the most approved pattern, gives a stump of ample length to provide sufficient leverage to enable the patient to easily swing a substitute, besides leaving the calf in a cone shape, that it may be made to assist the head of the tibia in supporting and carrying the weight of the body.

Roberts, however, in his work on surgery, says "to amputate at the upper and middle thirds; and that removals at other points result in useless stumps upon which prosthetical appliances cannot be placed and here Teale's operation finds an ideal application and result."

Now I venture the opinion that every word of that statement is incorrect and hence misleading, and it is only one of the many that can be cited from the pens of those to whom we naturally look for authority on such questions. The fact is, that serviceable limbs can be applied to stumps ending between a point three inches below the knee joint and one three inches above the ankle, and that between these points the value of the stump to the patient increases with its length until the junction of the middle and lower thirds is reached, and as for Teale's operation, I have already stated the only indications for its use.

The tibia of an adult, as before stated, should not be amputated at a point less than three inches from its upper articular surface, because such a stump will

usually flex under the influence of the stronger muscles and become only a hindrance.

In operations upon the foot in and above the metatarsal-phalangeal articulation, my own experience, strengthened by an opinion formed as the result of several months of careful study and thorough research, emboldens me to *advise the complete abandonment of every tarsal and tibio-tarsal amputation*. To give my reasons in detail from theoretical, physiological, mechanical and practical stand-points for assuming this position would alone more than consume the time allotted me for presenting this paper. I must be content, therefore, by giving in brief a few of the more important reasons, principally those that I can quickly demonstrate.

Viewed as a simple piece of mechanism, I find the foot to consist of a skillfully arranged arch; the calcaneum forming the abutment of one side, the tarsal and metatarsal bones the other, with the astragalus acting as the keystone, receiving the weight of the body and transmitting the same to the various members forming this arch. The construction of this peculiar arch renders it extremely elastic, its function in walking being to assist in breaking the shock produced when the limb changes from a passive to an active state at the moment that the foot is planted on the ground ready to receive the weight of the body when forced forward by the propelling limb, which is then obliquely extended to the rear.

In amputations of the anterior portion of the foot it is just as certain, in case you remove any of the bones necessary to the maintenance of this arch or sever the plantar fascia, that you will destroy the usefulness of this arch, as it is true that the leaving out of a single stone from the span of an arch will permit it to fall, and, whether you perform Lisfranc's, Hey's, Forbes', Chopart's, the subastragaloid or an osteoplastic operation, you leave the patient a foot that is of *no value* except to carry weight. In such cases the utility of the foot is either greatly impaired or wholly destroyed, and the portion allowed to remain becomes an appendage worse than useless; it is in the way of providing something better.

The foot, viewed simply as a member of the lower limb, is a triangular-shaped lever pivoted on the astragalus and capable of flexion and extension, the former produced by the action of flexor muscles, having their insertion anterior to the traverse tarsal joint, the latter by the tendo-achilles acting on the calcaneum. The foot is therefore the lever, the astragalus the fulcrum, the tendo-achilles the power, and the body the weight to be moved. The tendo-achilles being at one end of the lever and the flexors at the other, with the weight between them, it follows that, in Lisfranc's, Hey's, Forbes' and Chopart's operations, it is necessary to sever all or the greater portion of the flexors, while the extensor, the tendo-achilles, is permitted to remain.

The consequence is that, in this class of cases, there is always more or less contraction of the gastrocnemius and soleus muscles and consequent drawing of the end of the stump downward, causing pressure on a usually very sensitive cicatrix.

A study of the physiology of locomotion will, I think, fully demonstrate that the foot, in such cases, besides having lost its elasticity and being deprived of all, or nearly all, of its power of flexion, is so shortened that when in an active state at the time when its limb is inclined obliquely backward, it cannot be used as the lever or main propelling power by which the body is advanced to a position perpendicularly over the forward limb. The weight, power and fulcrum remain; but as the utility of the two latter depend entirely on the existence of the lever, of what use are they when this lever is removed?

This is all important, for the loss of a portion of a foot in most cases neces-

sitates the taking of a shorter step and a greater flexing of the knee of the sound limb (in order to compensate for the loss of propelling power), and a consequent lifting of the entire trunk when it passes over the active limb. This raising of the body with every step requires much additional labor, and causes the limp so noticeable in this class of cases.

Further, the breaking down of this arch not only destroys its strength, elasticity and usefulness, but it leaves the patient with a clumsy, unsightly foot that is not, for a moment, to be compared with the shapely form of a well-constructed artificial member.

In every case of Lisfranc's, Hey's, Forbes', Chopart's and similar operations, steel soles must be placed under the stump in an artificial appliance, thus adding to the length of the injured limb. This lengthening is further increased in nearly every case by the tendency to talipes equinus, caused by the uncounteracted action of the tendo-achilles, and, unless the sound limb be supplied with an extension to *equal all this*, an awkward, limping gait will result.

If the operator finds himself unable to overcome his prejudices in favor of tarsal-metatarsal, medio-tarsal or tarsal operations, I would recommend Lignerolle's as the one to be preferred, rather than any I have yet mentioned. But even with its natural ankle joint it does not possess the advantages of a Syme's or a supra-maleolar operation. The simple fact of being able to slightly extend and flex the heel after the foot or lever has been removed is of but little, if any, advantage to the patient. An artificial foot controlled by a firm heel cord (or a false tendo-achilles), preventing over flexion, securing to the wearer the advantages of a selfacting lever movement and enabling him to take a full length step with the sound limb without undue labor or exertion, is of far greater value to him, practically, than any theoretical subastragaloid or osteoplastic operation ever devised.

In this operation there is practically an excision of the lever portion of the foot, leaving the ankle and heel intact, and its only real advantage is in utilizing the natural heel, thus securing a flap that is accustomed to pressure.

Pirogoff's, LeFort's, Gunthur's, Brun's and similar osteoplastic modifications with their stiff ankles possess no advantages over Syme's operation, but on the contrary, by increasing the length of stump, they interfere with the construction of suitable ankle joint mechanism and are, therefore, a hindrance in the way of supplying a proper substitute.

Syme's operation, while it is open to many of the objections previously mentioned, is to be preferred to any at a lower point. It is true that there is more room underneath the end of the stump for the construction of ankle joint mechanism, but unless two and one-half to three inches in addition to the os-calcis and astragalus be excised from the end of the limb, there is not enough space to insert the best form of joint.

The advantages claimed for Syme's operation and its various modifications are more theoretical than practical; for only a small percentage of them can take any pressure on the end of the stump. We are, however, enabled, by a thickening antero-posteriorly of the lower portion of the artificial limb, to insert a heel cord, and by the use of rule joints a fairly good limb, though not a very serviceable one, can be made.

This one of the two models previously exhibited shows a heel cord or false tendo-achilles, placed posterior to the end of the stump. The stump here represented, however, is short enough to admit of the use of a cylindrical joint. If it were longer than here designed, it would be necessary to employ rule joints to the

detriment of the best interests of the patient. To briefly summarize them, we may adopt the following as our guide:

Avoid amputating within three inches of the knee joint. Do not amputate between the metatarsal bones and the junction of the lower and middle thirds of the tibia. At all other points save all you can and you will, in every case, have done the best for your patients.

In forming my conclusions regarding the relative value to the patient of tarsal and tibial operations I have drawn largely from my own experience and that of other instrument makers. Now, in the further support of my position, allow me to quote you the opinion of a surgeon of a world-wide reputation, one who, in my judgment, was one of the greatest surgical mechanics this world has ever known; one who, although his voice is stilled and his pen helpless, his teachings and example remain as a beacon light, shedding their luster along the pathway of the science he did so much to advance.

I refer to no less a surgeon than the deeply lamented Prof. S. D. Gross, who in 1872, nineteen years ago (and I again quote from his "System of Surgery," page 1,119), said:

My opinion of the usefulness of the stumps resulting from operations in or near the ankle joint is not very favorable; they may answer very well when the patient is wealthy, but if he be poor and obliged to work for his daily subsistence, he will generally get along much better with an artificial limb than with a stump that affords, even under the most propitious circumstances, only a very miserable means of support and is besides constantly liable, from the slightest causes, to pain, irritation and ulceration.

Stephen Smith in his recent work on surgery says:

The foot cannot be adequately substituted when the amputation is below the ankle joint.

And quoting from Hudson he further states:

The tarso and medi-tarso amputations will not be performed hereafter when there exists intelligence and humane regard for humane surgery and the greatest benefit to the sufferer, as these operations are in no respect conservative or creditable to the surgeon who makes them.

Having thus far confined myself to theoretical, physiological and mechanical standpoints, I will now take up the practical side of the question and endeavor to further strengthen my position.

Dr. Willis P. King of Kansas City, Mo., read an article before the Missouri State Medical Society three years ago, in which he highly extolled Lignerolle's operation, bringing forward many arguments in its favor. He gave a history of a double operation that, he says, gave results with which he was highly pleased. The patient, under date of March 15, 1891, writes me that he considers the operation the best that could have been done for him; that he can walk without a cane, *but always carries one.*

Dr. J. B. Murdock of Pittsburg (to whom, by the way, I am deeply indebted for courtesies and access to literature that has been of much value to me in my researches on this subject), in a paper read some four years ago before the Pennsylvania Medical Society, called particular attention to the desirability, where possible, of performing Chopart's operation, and in support of his advocacy of it, cited a well-marked case, one of double amputation that healed by first intention, the patient being able to get out on crutches in four weeks after the operation. "This case," says Dr. Murdock, "resulted in a complete success for my patient." When seen three years after the operation he was able to walk a distance of two miles at one time with no other assistance than an ordinary cane. I quote you the following from his article:

The fact that this patient is able to walk with no other assistance than an ordinary cane, and has been doing so for more than three years, speaks volumes in favor of the operation. It shows

the value of the stump as a support for the weight of the body and as a means of locomotion more clearly than could be shown by many cases where the operation was done only upon one foot. This was a very severe test of the operation. When one foot only is lost a patient is able to help it by throwing most, if not all, of his weight upon the other foot, but when both are gone, each foot must bear the brunt, and do its share of the labor. For this reason it is rare to see a man who has lost both of his limbs walking without the aid of a crutch (artificial limb manufacturers to the contrary notwithstanding), and when one is found who does so, he usually uses two canes, and in order to keep his balance, extends his arms to their full extent, and walks in a shuffling, ambling manner, much different from the manner in which my patient walks.

The patient before you is one of double amputation of the tibiae. The operations, the result of a railroad injury, were performed in July, 1888. Being of poor parents, his only means of locomotion for about a year was his knees, assisted by his hands, which will account for his stooping posture. Mr. P. D. Armour of Chicago, seeing him at a mission Sunday school, took pity on him and ordered me to make him a single artificial limb, which I did. Seeing the boy again about one year afterward and finding him worthy after due inquiry, he instructed me to make him a second limb with the results as here shown.

I selected this patient from quite a number of similar ones that I could have brought, because his stumps show a combination difficult to fit with what might be called first-class appliances. One limb has been amputated two and one-half inches below the knee, while the other was removed just above the ankle, presenting, in the one case, the two extremes in tibial operations—a very long and a very short stump.

Notwithstanding the facts that his stumps were allowed to remain unused for so long a time that there had been contraction in both, that for fifteen months he hobbled about on a single artificial leg and consequently was constantly in a strained or unnatural position, that his stumps will not admit of the construction of as good limbs as if removed at the points of selection, and that he has only been walking on both of them for five months, he can still outwalk any patient with a double tarsal operation of whom I have any knowledge. He can not only walk two miles without a cane, but he is on his feet as a cash boy nine hours a day. He has worked as a delivery boy, carrying packages about Chicago, and he can do, and does do, most anything that other boys do. His short stump, for reasons given above, prevents him from running or going upstairs, because, when this limb is forward and on a higher plane than the long stump, there is not leverage enough to enable him to raise himself to the necessary height. He is only one of quite a number of double amputations above the ankle joint that I can produce, all of whom can walk without either cane or crutch, the statement of my esteemed friend to the contrary notwithstanding.

Believing, with Dr. Murdock, that double amputations afford unusual advantages for studying this portion of our subject, I have selected from quite a mass of evidence the statements of a few patients and surgeons that I will read for your consideration.

On June 6, 1890, Dr. Benjamin Thompson of Tama, Ia., as the result of a railroad accident, performed a double amputation of the tibiae, making both operations at the junction of the lower and middle thirds. The following is taken from a letter written me by Dr. Thompson, under date of April 23, 1891:

After the legs were made and fitted, he (the patient) began wearing them at once without much inconvenience, and in February last, nine months after the injury, he came back to Iowa and married a girl at Maxwell, to whom he was engaged at the time of the accident; he stopped at Tama on his way home, for two days, and when he came into my office I did not recognize him at first. He walked in without cane or crutch and had fleshed up so that I scarcely knew him. He said that after getting some practice he could walk off without any assistance; he told me that they



VICE-PRESIDENT SAMUEL S. THORN, M. D., TOLEDO, OHIO.

did not hurt him a particle, and that if it was not for putting them on and taking them off he could get along about as well as with his natural feet.

(Signed)

"BENJAMIN THOMPSON,
Tama, Ia.

The following is from an agent of the Chicago & Grand Trunk Railroad at Shaftsburgh, Mich. Under date of April 16, 1891, he writes:

CHARLES TRUAX, Esq., Chicago :

Dear Sir—Your letter of the 11th at hand, and in reply will say that I have two artificial limbs. The right leg is off about half way between the knee and the ankle, and the left one is off just above the shoetop. They were amputated the 19th of August, 1890, and in six months I was walking on my artificial limbs. And I can walk very well. A stranger would not think that I have artificial limbs by seeing me walk. If there is anything more that you would like to know, please let me know and I will be glad to answer your questions. I walk all over without a cane or crutch.

I remain, yours truly,

(Signed)

W. H. BURDICK.

The letter I will next present to you is from the Hon. James Tanner, late Commissioner of Pensions, who writes as follows from Washington, D. C., April 14, 1891:

CHARLES TRUAX, Esq., No. 75 Wabash avenue, Chicago, Ill.:

My Dear Sir—Yours of the 10th is before me and contents noted. In reply to your inquiries I have to say, that both my limbs are amputated about four inches above the knee. At first I had to use two canes. I desired to use crutches, but the maker of the limbs advised me strongly against it, fearing, as he frankly said, that if I commenced using crutches, I would think that I never could do without them. For a great many years I have only used a cane, and around the house and office, unless I am going off the floor I am on, I seldom touch my cane.

You say that if I can furnish you any information on this subject it will be duly appreciated. I do not know that I can furnish you any information, but if twenty-eight years' walking on a pair of amputated legs, which has caused me to study the subject a good deal and to observe the experience of others afflicted in like manner in some degree or other, entitles my opinion to any value, then I don't hesitate to say that I fully agree with you, and in my mind there is no question at all but that as compared with an amputation through the middle of the leg or a little lower, the amputation through the ankle or instep is one of the very worst.

I am, very truly yours,

(Signed)

JAMES TANNER.

I will now read you a letter from a patient, who, at Rock Rapids, Ia., in 1888, suffered synchroanal amputations of all his limbs. The operations were performed by Dr. G. C. Wallace of Rock Rapids, Ia., with only the assistance of a druggist and a blacksmith. The injuries were the result of frost-bite, the patient having been exposed to a western blizzard for a considerable length of time. The following is his letter written with an artificial hand:

CHARLES TRUAX, Chicago, Ill.:

Dear Sir—In reply to yours of the 10th inst., I will state that Dr. Wallace amputated all four of my limbs on Jan. 27, 1888, and in September, 1888, you put artificial limbs on me, and almost ever since I could walk well, and now I am following a plow all day, and also can walk up and down stairs with perfect ease and have been seeding or farming all spring.

Yours respectfully,

(Signed)

JOHN LANGFELDT.

Now, gentlemen, if the reasons I have thus far advanced are not of sufficient weight to convince you of the correctness of my position on tarsal and tibio-tarsal amputations, allow me to further strengthen it by placing before you the testimony of the surgeons of this association. Here, in an unanswerable argument and over your own signatures, is evidence strong enough to forever condemn any and all tarsal and tibio-tarsal amputations.

In order that I might not base my conclusions from theoretical and empirical standpoints alone, I have collected statistics tending to show from an experienced

and practical point of view, the relative value to the patient of these two amputations as compared with those near the middle of the tibia.

Blanks were accordingly prepared and sent to 1,956 surgeons, of which 947 responded with answers furnishing statistics of operations performed between the years 1885 and 1891. Before securing this number of answers, however, I was obliged to write a second letter to 1,106 of the first mentioned number which, with other correspondence, necessitated the sending out of fully 3,500 letters; 2,793 operations were reported, 2,135 of which were amputations at or near the junction of the lower and middle thirds of the tibia; the balance, 658, having been



From a Photograph of John Langfeldt, showing Synchronal Quadruple Amputation.

made between a point three inches above the ankle joint and the metatarsal-phalangeal articulation.

Of the 2,135 tibial amputations, 1,937, or 90.7 per cent., resulted in sound, healthy stumps; 67, or 3.1 per cent., suffered reamputation; while 107, or 5 per cent., died, leaving only 91, or 4.3 per cent. of stumps upon which compensative appliances could not be worn. Of these tibial cases, 962 were seen by the surgeons after they were wearing, or had attempted to wear, an artificial limb, 836, or 87.9 per cent., of which walked with an easy movement and a comparatively graceful step.

Of the 658 tarsal and tibio-tarsal amputations, 544, or 82.7 per cent., resulted in sound, healthy stumps; 55, or 8.3 per cent., underwent reamputation; while 21,

or 3.3 per cent., died, leaving 93, or 14 per cent., upon which prothetical apparatus could not be worn.

Of this class of cases, 169 were seen after attempting the use of compensative appliances, 92, or 54.4 per cent., of which could walk well.

If we can judge correctly from the foregoing statistics, in every 100 cases or each of these two classes of operations, we may reasonably expect the death loss to be in favor of tarsal operations, as 5 is to 3.3. But it must be borne in mind that in the majority of these cases the tibial operations were performed in preference to the tarsal, because of the greater extent of the injury, and this difference in mortality may safely be attributed to this cause, and not to the fact that the operations were made nearer the trunk, while the ratio of reamputations necessary will be in favor of tibial amputations, as 8.3 is to 3.1.

The number of healthy stumps resulting from these operations would be in favor of tibial operations, as 90.7 is to 82.7, while the number of unhealthy stumps would also be in our favor, as 4.3 is to 14 (this seeming discrepancy in figures is due to the difference in the rate of mortality). Of those who attempt to wear artificial substitutes, we may expect to get favorable results in 87.9 in tibial, and 54.4 following tarsal operations.

These statistics, by the way, make a very creditable showing for the surgeons of this country. It must be borne in mind that the bulk of these cases are from the records of what might be called the country surgeon. Large numbers of them have been performed under the most difficult circumstances, many times with few, or no, trained assistants, and under conditions very unfavorable to the carrying out of proper aseptic methods.

In my opinion it matters not whether the patient prefers beauty of appearance to usefulness, or *vice versa*; a careful investigation of the facts will arrive at the same result. I therefore hold that, whenever it becomes necessary to cut into the arch of the foot or sever the flexors of the ankle, it is far better for the patient if the surgeon adopt as his point of selection the junctions of the middle and lower thirds of the tibia.

After a careful study of results obtained in fitting limbs after tarsal amputations, I have come to the conclusion that, as a general rule, between the junction of the lower and middle thirds of the tibia and the tarsal-metatarsal articulation, *every additional inch saved to the patient is an additional cause of inconvenience and annoyance*, because it is that much more of an obstacle in the way of the construction of the best form of artificial substitute.

I recognize that this is directly the reverse of the teachings of our standard authors of to-day; but if those who still cling to what they persist in calling by the misnomer of conservative surgery, could, even for a few months, be compelled to assume the position of a patient and suffer the inconveniences of some one of the tarsal operations, a practical light of such brilliancy would burst before their vision as would forever dispel the theoretical darkness in which they are now seemingly involved.

There is scarcely an authority on surgery that does not advise reamputation in certain cases. Hamilton, Agnew, and nearly all our writers advocated a second operation where stumps were too conical, unduly sensitive, too thinly covered, and in cases of knee-bearing legs where the stump projected so far in the rear as to be in the way.

Ashurst and a host of others amputate for irremediable club foot and other malformations, all of which are either to give the patient greater comfort or to please the eye of himself or friends.

And yet these same surgeons, advocating amputations and reamputations for seemingly trivial reasons, and that, too, at a time when the rate of mortality ran high, solemnly declare that conservative surgery will not allow the sacrifice of a single ounce of bone or tissue beyond the danger line. Why? Because they say the nearer you approach the trunk the greater the risk of life.

If we should admit it, why on the one hand advocate amputations and reamputations that the patient may enjoy life more fully, and on the other, argue that there are no indications for waste of tissue in amputation, no matter whether it improved the conditions of the patient or not?

Dr. Murphy moved that the discussion on Mr. Truax's paper be deferred and taken up when the association deemed it necessary. Carried.

Dr. A. J. Mullen, Jr., of Michigan City, Ind., read a paper entitled "Conservatism in Surgery, with Cases."

CONSERVATISM IN SURGERY.

Any remarks I might make on conservative surgery may seem inopportune when one considers the thorough and brilliant manner in which the subject has been handled by some of the most talented and clever surgeons of the day. A quaint brother might be inclined to place the subject of conservative surgery in the category of "old chestnuts." Granting this to be the case it is nevertheless a sound chestnut; there are no worms in it.

In glancing over the province of surgery it is difficult to find a surgeon who cannot point to at least one case that has come under his observation in which the prerogative of amputation has been abused. Once off a hand, an arm or a leg is soon buried in the waters of Lethe. They tell no tales. The point is settled; there is no room for argumentation; no opportunity for disputation. Many amputations are hastily made. A compound comminuted fracture, with muscles and deep-seated tissues badly lacerated, presents itself. As a rule amputation is the one idea that the surgeon's intellect grasps from the scene before him. Is the injured limb always looked over and examined carefully and minutely? Is not an operation frequently hurried by visions of beautiful stumps and an operator anxious for the fray? How often does this predominant and unyielding idea of amputation allow the mind to weigh matters carefully and render a judgment at once creditable to the surgeon and equitable to the patient? The imagination of the railroad surgeon should be trained to keep this one great truth before his mind's eye, viz.: "That to have saved one limb is more to his credit than to have removed, no matter how skillfully, a hundred."

It is a good rule to adopt that in all cases of severe injury where a surgeon can find that an artery, no matter how minute, has retained its integrity, he is justified in awaiting results.

Surgery has made great strides. Improvements made have removed the necessity of amputation in many cases in which the operation would formerly have been considered imperative. The railroad surgeon's ordeal is a consensus of perplexities. Every case presents an innovation.

The surgeon must have been endowed with that great desideratum, common sense, and must be quick to perceive, bold to execute, and must have enough conceit and self-assurance to act, at all hazards, as his judgment dictates. I shall not occupy the time of this assembly by further remarks, but will conclude by citing a few notable cases of conservatism that have come under my personal care and

observation. In reporting these cases I shall be brief, appreciating the fact that intelligent and practical surgeons need not be bored with every detail in treatment, as they could readily surmise what, under certain conditions, would be done.

Dec. 18, 1888, J. C., age forty-eight, engineer Michigan Central Railroad; running at the rate of forty miles an hour; misplaced switch ditched and turned engine over, burying C. under the engine. Two hours elapsed before the unconscious man was extricated. Patient was placed in a way-car and taken twenty miles to his home, Michigan City, Ind.

Examination revealed the following injuries: Wound extending from symphysis of lower jaw, laying left cheek open, fracturing zygomatic process of left temporal bone around back of head and terminating at outer canthus of right eye; the left ear was almost torn off; left hand and arm burned to elbow. The right arm suffered a triple fracture and was literally roasted from elbow down; the fingers and thumb were burned to a crisp. The fractures of this arm involved both bones; one was eight centimeters above the wrist; one seven centimeters below the elbow; the olecranon process of ulna was fractured.

There was a compound comminuted fracture at the middle third of right leg comprehending both bones; the tibia was split longitudinally and a wedge shape piece of bone torn out. The foot of this leg was resting under the knee of the same leg, and the upper end of the fractured tibia protruded through the overalls all the time patient was under the engine. The broken lever pierced the middle third of left thigh to the bone and literally pinned the injured man to his place.

Patient was pulseless and cold. With proper exhibition of hot coffee and cognac, hot blankets and bottles patient rallied sufficient at the expiration of fourteen hours to allow of surgical procedure.

Fingers of right hand amputated at their metacarpal articulation; thumb and its metacarpal bone removed; fractures of forearm adjusted; this arm had to be carefully dressed every day; great masses of burned tissue sloughed and fell out; one of the sloughs involved and cut the radial artery necessitating the ligation of that vessel. In the face of constant and troublesome interference good union took place at each seat of fracture.

The great length of time that the leg was doubled upon itself, the apparent hopeless condition of the parts and the severity of the fracture caused us to prepare for amputation of that member. The patient's condition made us fearful as to the result. Finally, deciding to wait, the injured leg was thoroughly cleansed, pieces of loose bone removed, the fracture adjusted as well as possible and the leg placed temporarily in a hammock splint, our intention being to amputate at a later hour if patient's condition so warranted. The result was that the original dressing was not disturbed for six days. Every indication and symptom was favorable to repair and regeneration of the parts. To be brief, the leg was saved; the right arm was saved. The face and scalp wound contained twenty-seven sutures, healed by primary union. The patient came out after one year's confinement in a good condition excepting the loss of fingers and thumb of right hand and a slight ankylosis of elbow of left arm.

The leg is as strong as ever and there is but slight deformity in its general, outline and contour; there is no interference in good and natural locomotion. During the siege the patient had erysipelas, la grippe and pneumonia of the right lung. The patient's vitality was wonderful. Saving the arm and leg was a remarkable piece of conservatism.

Jan. 21, 1888, Edward G., age thirty-four, brakeman L. N. A. & C. Railroad, at Battle Ground, Ind. Unloading piano from car; slipped and fell; entire weight of

piano concentrated on right knee, crushing the same. Leg dressed temporarily at that point by local surgeons and patient sent to Michigan City, Ind., reaching said point fifteen hours after accident occurred. Patella was fractured; comminuted fracture of outer condyle of femur, and compound comminuted fracture of tibia and fibula at and below tubercle of tibia. Sixteen pieces of bone were removed, larger pieces of bone with periosteal attachments were allowed to remain. Concluding to make the attempt to save the leg I summoned Dr. J. G. Davis, then chief surgeon of the Monon road, Chicago, to see the case; he concurred in what was thought to be a forlorn hope. The leg was placed in a hammock splint; this allowed free access to all parts of the injured member. Six weeks after necrosis set in, necessitating the removal of six pieces of bone, each of which was as large as one's little finger; the shaft of tibia below tubercle had to be dug out and scraped. The tibia at this point was now a perfect shell; the aperture after the operation was seven centimeters in diameter and about the same in depth. The opening gradually but slowly filled in. The leg was saved and patient made a good recovery. The knee joint is, of course, ankylosed. The joint is one hard mass of bone and tissue, so much so that one cannot distinguish patella, condyles of femur, or tuberosities of tibia. Six months elapsed before patient could walk with use of a cane. Mr. E. G. is now running regularly on the L. N. A. & C. Railroad as conductor.

Frank T., brakeman, M. C. Railroad, aged thirty-five, injured in February, 1877, at Grand Crossing, Ill. Right hand caught between deadwoods and crushed; palm of hand and dorsal surface badly lacerated; metacarpal bones fractured; wounds of hand extended up palm surface of wrist and arm one decimeter. Patient was taken to Michigan City, where a surgeon wanted to amputate hand. Patient and family refused to allow it. The attending surgeon refused to have anything to do with case unless allowed to amputate, saying it was the only practicable treatment. Patient remained without attention for forty-eight hours. The hand and arm were douched occasionally with cold water. The injured man then went to the late and lamented Dr. Moses Gunn of Chicago, who saved entire hand.

The man at this writing is yardmaster L. N. A. & C. Railroad at Michigan City; has perfect and good use of hand and fingers.

While surgeon for Northern Indiana prison at Michigan City, 1880, John H. D., aged thirty-four, life man, cut his hand off with hand ax in order to be relieved from work. The hand hung limp and cold, attached only by the integument and some little muscular tissue. Both radial and ulnar arteries were severed; the radius was cut at styloid process; ulna not injured. Radial artery ligated and hand placed in position and deep silver wire sutures taken; hand and arm placed in long splint and douched three times a day with antiseptic solution. Hand saved. Can hold fork or any small articles between index finger and thumb. All other fingers useless. Very slight flexion at wrist.

William S., aged twenty-one, brakeman M. C. Railroad, March 3, 1887; fell between cars; right leg crushed and ground off at about middle third of tibia.

It was difficult at the time to determine the amount of damage done the surrounding soft parts. An endeavor was made to save the knee joint. At the urgent request of the patient he was taken to a relative's house, the defective hygienic condition of which almost proved fatal. Third day after amputation the flaps succumbed to mortification, the result no doubt of the vitality of the same having been impaired by the accident. The stump was laid open presenting a large surface in which the bacteria of putrefaction were hard at work.

The bones protruded seven centimeters. Patient had dry tongue and high

temperature. Douched parts with bichloride solution; Dr. E. J. Bonine of Niles, Mich., suggested charcoal and brewer's yeast poultices; applied between iodoform gauze and were renewed every six hours. At the end of twelve hours healthy granulations peeped out from various points. Healthy granulations sprung from the flaps like so much vegetation, the constitutional disturbances began to subside, repair set in and kept up until it terminated in a good stump. The charcoal and yeast poultices proved of so much benefit in this case that on many occasions since it has been used with like success. Its use is indicated in any wound that has an unhealthy appearance. To those who have not given it a trial I urge its use. The patient has a good and useful stump and wears a leg without any discomfort.

Through the courtesy of Dr. F. W. Mann of the Detroit Sanitarium I am able to report the following wonderful case:

J. T., age thirty, switchmen M. C. Railroad, was at work in the yards Oct. 28, 1890, when he was run over by a freight car, the wheel passing over both legs. According to unimpeachable testimony the freight car weighed itself ten tons and was loaded with pig iron weighing twenty-five tons. This produced a compound comminuted fracture of both bones of both legs at about the junction of the middle and lower thirds. Both feet hung like flails. No pulsation could be detected in the arteries of either foot. The flesh wounds were anterior in both cases. No loose bones were removed, but several fragments were found with periosteal attachments. The question of immediate amputation was discussed, but it was decided that an attempt should be made to save one or both feet. The wounds were thoroughly douched with antiseptic solutions; counter openings made and drainage tubes inserted; light antiseptic dressings and newspaper splints.

Patient emerged from the influence of the anæsthetic exhibiting evidence of very severe shock; very pale; pulse small and fast; restless.

Oct. 29—Considerable hemorrhage from the wounds during the night. Oct. 30—Both legs undressed and drainage tubes removed; both legs looked well except for a rather lifeless appearance to the muscular tissue in the wound of left leg. From this time on the left leg was dressed daily, the right only requiring a change every third or fourth day. From this date the patient steadily improved. Plaster of Paris dressings were used in the later treatment. Union, though tardy, has taken place in both legs. There exists at present a couple of small sinuses in the left leg, but those are closing up.

This case is of great interest in being: 1. A compound comminuted fracture of both legs. 2. In the fact that both legs were not ground off by the car wheel, the car and its contents weighing thirty-five tons. 3. That repair should have followed so severe an injury.

Dr. A. J. Mullen, Sr., of St. Louis has kindly given me the following three cases:

Away back in the "fiftys" a patient presented with a hand that had been crushed between two saw logs. The fractured carpal, metacarpal and phalanges were comminuted, tendons and muscles resembled a pulpy mass, palmar arch ruptured, amputation seemed imperative.

Resolving (from past experience) to give nature a chance a lump of soft putty was placed upon a splint, the crushed hand and fingers pressed into it, the putty welling up between the fingers, separating them. To allow for swelling the putty was kept soft by the addition of linseed oil. When the swelling began to subside it was allowed to harden and contract, giving support to the mutilated hand. I doubt if any other form of splint or bandage would have been as simple or sensible

In due time the dressing was removed; flexion and motion resorted to. The result, though not as symmetrical or beautiful as the hand of Mary, Queen of Scots, was more useful if not ornamental than an artificer could supply.

During a visit to a friend in Cincinnati, O., in the year 1857 a boy thirteen years of age was brought to his office with a hand torn apparently to shreds, having been crushed in cog wheels. The phalanges of thumb and fingers presented a shapeless mass of torn muscles and crushed bones.

The doctor decided to remove all the fingers as well as thumb and requested my assistance. I followed him into an adjoining room where he was preparing for the operation and suggested the propriety of making an effort to save the fingers by the putty dressing referred to in a former case, and if gangrene supervened subsequently such parts might then be removed; he accepted the suggestion and went out to procure the putty. A few whiffs of chloroform quieted the boy, the hand was immersed in hot salt water which quickly cleansed the wound of clotted blood and restrained the hemorrhage, the hand and fingers pressed into the putty on a splint, all supported by a bandage.

At that time the profession in Cincinnati were chary in the use of the Lethean liquid, the first death from its use occurring in a dentist's chair in that city.

Some eight months later I saw my friend and he informed me that the hand and fingers he came so near sacrificing did well and would become quite useful; he was strongly in the faith that with hot salt water as a cleanser and hæmostatic and the use of putty as a splint or dressing many hands and fingers that are lost under the usual treatment might be saved.

The "Edinburg Medical Journal," vol. xxii, page 372. "Conservative Surgery," by John W. Keating, M. D.:

The following notes, which will speak for themselves, were sent me a few days ago by Dr. Alexander J. Mullen, a prominent surgeon of St. Louis. This case is certainly an extremely interesting one and unique, so far as I can judge:

"On the 5th of September, 1856, I was called in haste to visit the family of Mr. John Mayingo, living three miles west of Napoleon, Ripley County, Ind. I was informed that a child had had its hand chopped off. With amputating case under my arm and with Gilpin speed I soon arrived and found a little girl about six years old lying on a bed, her right arm tightly corded below the elbow, supported by a pillow, while a cold, blue shriveled hand dangled from the string, held by a small portion of skin not an inch in width. Her appearance, as well as the quantity of blood scattered around, showed that much blood had been lost. While an elder sister was chopping wood, she had attempted to gather chips from the block; the axe descended, striking the back of the arm about an inch above the wrist, cutting through both bones, dividing arteries, nerves and tissue. The axe on the radial side, cut into the block, leaving but a small portion of the integument on that side and on the under ulnar aspect. My first impulse was to form flaps and remove a portion of the bones, making the amputation complete. At that moment a large splaying needle, sticking in the woodwork above the door, armed with a strong flax string, attracted my attention. The idea at once occurred to me to attach the hand firmly with strong sutures to the stump, let on the circulation and trust to Providence for the result. The hand was firmly and with force pushed against the opposing surface, and two deep sutures, above and below, were tightly tied. The cord was removed from the arm, and the circulating medium was allowed to go on its way rejoicing. No arteries were secured, the arterial blood being allowed to find its way as best it could in the apparently lifeless hand. The hand and arm were then fixed in a splint and bladders of warm water applied.



VICE-PRESIDENT GEORGE W. COIT, M. D., MISSOURI VALLEY, IA.

For a few hours there was slight welling out of blood around the wound, trifling in quantity. No change was observed either in appearance or temperature until the fourth day, when the hand became puffy and the entire cuticle slipped off. I must confess that I felt like "giving up the ship," considering the efforts to save the hand a failure, and attributing the puffing to decomposition. But a few moments' reflection, after noticing the absence of odor emanating from the hand, assured me that it was not dead. On the fifth day a fungoid growth was observed sprouting from the entire line of the cut, purplish in color, from which, upon the slightest touch, oozed a thin sanious fluid. The hand now assumed a rosy hue and the temperature began to rise. I regret that I was not possessed of a clinical thermometer; it would have been not only interesting but instructive also to have noticed the daily changes taking place until the circulation was reasonably established. On the ninth day the soft ring of spongy granulations that wound around the arm was as large as a half inch rope. Under gentle pressure and the application of argent. nitrat, the granulations finally disappeared. The sutures were removed on the twelfth day and the hand was saved. It was some two years before it became a useful member. I had the pleasure of eventually seeing that hand plying with much grace the needle."—*Philadelphia Medical Times*, Aug. 19.

In April, 1889, saw a case of Dr. H. E. Mullen of Hammond, Ind.

Jacob Heinz, age thirty, farmer, attempting to hang up shotgun both barrels exploded and contents tore through left forearm; flesh torn out from elbow to wrist; radius fractured and ulna fractured near elbow; a piece of bone triangular in shape, five centimeters long, was carried away; the ends of the bone were only three millimeters thick at the part blown off. Three of the five surgeons present insisted upon immediate amputation. Dr. Mullen as persistently insisted on making an attempt to save the hand and arm. An effort therefore was made to save the member. Continued use of antiseptic dressings, copious hot water with bichloride irrigation; application occasionally of yeast and charcoal poultices. There was a complete recovery by Aug. 1, 1887. Man was able to plow and do all farm work during the fall of that year. Middle, third and little finger flexed upon palm, but movable. Index finger and thumb perfectly movable.

Would respectfully refer you to the case of Dr. L. L. Staton, Tarboro, N. C., entitled, "Hand saved after complete separation," published in the "North Carolina Medical" for May, 1880.

Also to case reported by Dr. James Bell in Montreal Medical Journal of February, and published in "Journal of the American Medical Association" of Feb. 21, 1891, page 271, entitled "Compound comminuted complicated fracture of the distal extremity of femur. Recovery without amputation."

DR. W. L. ESTES OF BETHLEHEM, PA.—We want no theory; the important things are facts and the presentation of cases. I dare say that many will agree with the author that an important thing in railway surgery is conservatism. There is no need of discussing where an amputation shall take place, whether at the tibia-tarsal joint or through the tarsus, if we can save the leg. An important feature, I hold, is to attempt to save a limb in every instance, if possible, or preserve the tissues as far as possible wherever the injury may take place. It seems to me that conservatism in railway surgery should begin at the time the accident occurs.

As surgeon for one of the eastern roads and having charge of perhaps one of the first hospitals that was established for the treatment of railroad employes—established as far back as 1873—it has been my fortune to treat a large number of cases of railway accidents. Many of the cases were brought from long distances, considerable hemorrhage having taken place after shock, some of the patients having bled almost to exsanguination. The idea occurred to me that if some appliance or apparatus could be devised and distributed along the line for the preservation of the blood, one which any man of ordinary comprehension could use with instructions, many lives might be saved. Acting on this I made what might be called an “accident case.” It consisted simply of a few bandages, some antiseptic material in the way of tablets of bichloride and bicarbonate of soda, a few ligatures, needles, etc. As a result of the distribution of these accident cases along the lines or stations many lives have been saved. In severe railroad injuries we know that when patients are brought from a long distance they are apt to die before or shortly after they reach the hospital. Since we have adopted this plan we have on record twelve double synchronous amputations, with two deaths, largely due to the preservation of the blood on account of these instruments.

Listerism or aseptic surgery is one of the grandest features of preservative surgery to-day. The fact that surgeons are becoming more conservative is due to it rather than to any other agent of which we know. The class of injuries that the railway surgeon meets puzzles him oftentimes, so that he hardly knows what to do.

Some years ago I had the case of a man who had the lower third of his leg terribly crushed, involving both bones and soft tissues to a great extent. The flexor muscles were torn almost transversely across; there was a comminution of the tibia, so I had to remove an inch and a half of the bone; nothing seemed to be intact but the principal blood vessels and nerves; the skin was not particularly comminuted or injured. I determined to try and save the leg. I took out an inch and a half of the tibia and sawed off the fibula to correspond in length, wired the ends of the tibia and fibula as well, and the man made a perfect recovery with a useful limb. I thought after that, if it were possible to save a limb, why amputate? I must confess that before then I was amputating in these injuries. I remember in a number of instances after that with more or less success of wiring bones together. I found where there was a great deal of tissue lost in passing wires through bones there would be more or less motion, no matter what sort of dressing you put on. I conceived the idea of plating bones together. After working on this for sometime I found

that Schede of Hamburg recommended something of the sort. He recommended that a steel plate be passed across the fracture and held in place by wires wound around the bone. I have used screws instead. (Dr. Estes here exhibited some plates and steel screws which he uses in his operations.) The steel screws hold the plate in place, the plate going across the fracture and fastened to either end of it. I found during the process of repair that the bone peg was soft where the screw holds as well as the ends where the callus forms there would be motion of the bone; so I preferred to change the binding material to ivory, by which you can get a good grip on the bone, and it works much better from the fact that ivory will absorb and be less irritating than an aseptic screw. I have been using it for a number of years and I have treated at least twelve or thirteen cases with the process—cases made up of compound comminuted fractures of the fibula, tibia and humerus. In the case of fracture of the humerus it was not only a bad comminution of the humerus, but the muscles of the triceps and the artery which accompanies the nerve on the posterior part of the humerus were cut, and as a result a terrible hemorrhage occurred and the case seemed almost hopeless. Notwithstanding the great comminution I made an attempt to save his arm. I plated it and allowed the plates to remain on for two or three weeks, at the end of which time the bones were sufficiently solid to remove them safely. In two months the man was up and using his arm. The other cases were all successful but one and that was a case of a very heavy man, who, notwithstanding the immovable dressing that was applied, persisted in moving about, and the leverage on his foot was sufficient to impart motion. The bones were not in absolute apposition, consequently bony union did not take place. The procedure is to plate the bone, put on under aseptic precautions, and an immovable dressing at the time consisting of plaster of Paris with some reinforcement at the point of fracture in the way of iron bars or tin straps, making a dressing so that at the seat of injury there is a fenestrum left. The wound should be dressed from time to time. I leave the primary dressing on three weeks; after that I find I can remove the plate and screws without difficulty. One advantage of this over the wiring process is that in wiring you must of necessity separate the bone from contiguous tissues; you therefore remove the periosteum, whereas in this process it is only necessary to expose the bone at one place, immediately under the wound, making a linear wound, and the only wound posterior or at the bottom for drainage you close by your linear wound in passing the plate directly on the bone, leaving the ivory plate sticking out. I have the old screws I first used and the ivory

pegs I used afterward here with me. The projecting pegs can be removed in three weeks. Besides injuries of the long bones we frequently have to deal with comminutions of the head or cranium. I dare say all of you will agree with me that six or seven years ago we never thought of doing anything but removing comminuted bone from the head, taking it out and leaving the bone to heal by fibrous tissue or putting it in a silver plate; but usually surgeons leave the bone open. The result was it healed with a depressed cicatrix, with nothing to protect the head at the site of injury but a pulsating fibrous membrane. Nowadays conservative surgeons replace all that bone. I have had three recent illustrative cases. One case was a compound comminuted fracture of the antero-inferior angle of the occipital bone, involving a portion of the temporal and parietal bones. I removed an area of $2\frac{1}{2}$ by 3 inches of bone, trephined the portion pressing upon the brain, taking the bone out, removed the clots carefully, preserved them for further manipulation in a warm carbolic solution. The cranial cavity was cleansed with a 1-10,000 sublimate solution, fragments of bone replaced, and in two weeks the man was out of bed apparently well.

I might go on and cite a number of other cases, but I simply desire to bring these things before the association, and have only to add with the author of the paper that much of our conservatism depends upon the preservation of the soft tissues. We frequently cannot estimate by simply looking at a limb the actual amount of injury that has taken place. Under intact skin, as you all know, there are crusted or torn muscles, and there is nothing that I know of which will save these muscles but absolute relaxation of tension. Under the skin we sometimes have a large amount of blood pressed out, and the torn muscles are oozing in spite of tension of the skin. Perhaps some of the lesser arteries are torn, and the only thing that can be done to save the limb is thorough drainage. It must be slit in order to allow the oozing of blood to escape; but this must be done under the most absolute asepticism. It is my custom first to shave and thoroughly scrub the leg with soap and water (I use green soap), then use absolute alcohol and after that 1-2,000 sublimate solution.

DR. WILLIS P. KING OF KANSAS CITY, MO.—The paper read by Dr. Mullen is the kind of a paper we like to hear. I do not think I can add anything to it other than to say that the results he obtained in these cases were remarkable, and these remarkable cases are constantly occurring all over the country. Such results could not have been obtained under other than antiseptic conditions. We have been taught a good many things; we have learned one thing, that almost

any thing is possible by the use of antiseptics in the crushing of limbs by ponderous moving trains. We meet with a class of injuries met with nowhere else in life; we meet with lacerations and contusions of soft parts, crushing and comminution of bone. Years ago we would have lopped off such legs, arms and feet. There is one principle to guide us and that is where we have a warm foot or warmth in an extremity we should under antiseptic precautions put the limb in the best possible condition and wait. If we are in doubt at any time we should wait. Years ago if the surgeon did not remove all of the torn and lacerated parts he knew he would lose his patient. If there be circulation of blood there will be a re-establishment of the parts, and where you have blood you have building material. If you have no circulation and can get none, and especially in the course of forty-eight hours you should see evidences of mortification there is nothing to do but to amputate. You can wait with safety if you know that the site of the injury has been perfectly asepticated. With the means at our command now of wiring bones together, of removing all loose bone, as has been stated, we can put these injured limbs in excellent condition. We are making progress in these matters every year. The last ten years have taught us wonderful things, and the next ten years will perhaps teach us as much or more. To teach a man to save a leg when it is almost torn from the body is the province of conservative surgery; to cleanse, wash and wait for nature to build up and save the limb, that is our business, that is science and that is conservative surgery.

DR. R. HARVEY REED OF MANSFIELD, O.—I indorse every word Dr. King has uttered. On the railroads that have no hospital system the employes entertain the opinion that the railroad surgeon is the man who wants to cut off legs and arms; they are afraid of him. They are afraid that when a surgeon is called in, no matter how slight or grave the injury, he will advise cutting off of the limb. They do not understand that it is the railway surgeon's duty to practice conservative surgery. They do not understand that with the present methods of antiseptic surgery we can save a great many more limbs now than in former times; they do not understand that we can save fingers and hands which a few years ago could not be saved. I have two cases that occurred in my practice where the fingers were completely severed and were sewed on again, and they are in fairly good condition to-day. It simply shows what can be done with proper care and strict antiseptic precautions.

I will not further take up the time of the association in discussing this subject, except to say that I am decidedly in favor of conservative

surgery; but there are cases, however, where conservatism may be out of place—cases in which to be too conservative would be wrong. I believe in practicing conservative surgery when it is possible to do so, and when cases present themselves for the radical treatment we should not hesitate to apply the knife.

DR. E. R. LEWIS, KANSAS CITY, MO.—I do not intend to discuss the paper at length, but the remarks made by the first gentleman who spoke more particularly of bone tissue and the methods of operating upon it. I simply wish to say that there is probably a greater field in the future for us in relation to the application of antiseptics in bone surgery than any other department of our art. The illustration, as represented here, with the model attached to the bone, did not strike me as being favorable from my own experience. In the last three years I have had no less than six or seven cases of ununited fractures in bones where it became necessary to fasten them together. The recent application of mechanical measures for fastening bones are the things for us to-day. In operations upon bone the use of wire is not as satisfactory as ivory pegs in fastening the bones together. If steel nails are used they have to be removed, and we do not wish to remove them, because in so doing we tamper with the wound. The ivory pegs become absorbed, and union is much better.

DR. LEWIS then reported some interesting cases to illustrate his methods.

DR. S. S. THORN OF TOLEDO, O., said he had been using the apparatus for securing bones, as shown by Dr. Estes, for nearly four years. He also reported cases illustrating his mode of procedure in operations upon bone.

The paper was further discussed by Drs. Weaver and Mynter.

The meeting then adjourned to meet at 2 P. M.



AFTERNOON SESSION.

The meeting reassembled at 2 P. M., the president being in the chair. The chair stated that the nominating committee was ready to make its report. The report was then read by the secretary as follows:

REPORT OF NOMINATING COMMITTEE.

Your nominating committee, after careful consideration of the interests of the organization, unanimously recommend that the next annual meeting of the association be held at Omaha, Neb.

Our nominations for officers of the association are as follows:

PRESIDENT—Dr. J. H. Murphy, St. Paul, Minn.

FIRST VICE-PRESIDENT—Dr. G. P. Conn, Concord, N. H.

SECOND VICE-PRESIDENT—Dr. B. L. Hovey, Rochester, N. Y.

THIRD VICE-PRESIDENT—Dr. Geo. Ross, Richmond, Va.

FOURTH VICE-PRESIDENT—Dr. J. C. Hearne, Hannibal, Mo.

FIFTH VICE-PRESIDENT—Dr. G. W. Coit, Missouri Valley, Ia.

SIXTH VICE-PRESIDENT—Dr. S. C. Benedict, Athens, Ga.

SEVENTH VICE-PRESIDENT—Dr. B. F. Eads, Marshall, Tex.

ASSISTANT SECRETARY—Dr. D. C. Bryant, Omaha, Neb.

SECRETARY—Dr. E. R. Lewis, Kansas City, Mo.

TREASURER—Dr. R. Harvey Reed, Mansfield, O.

EXECUTIVE COMMITTEE—Three new members: Dr. C. W. P. Brock, Richmond, Va.; Dr. W. S. Weissinger, Hernando, Miss.; Dr. J. W. O'Connor, Denver, Colo.

COMMITTEE OF ARRANGEMENTS—Dr. W. J. Galbraith, chairman, Omaha, Neb.; Dr. C. D. Evans, Columbus, Neb.; Dr. D. C. Bryant, Omaha, Neb.; Dr. G. W. Shedler, York, Neb.; Dr. S. B. Taylor, Blair, Neb.

COMMITTEE ON TRANSPORTATION—Dr. W. B. Outten, St. Louis, Mo., chairman; Dr. S. S. Thorn, Toledo, O.; Dr. C. B. Stemen, Fort Wayne, Ind.

COMMITTEE ON NECROLOGY—Dr. W. P. King, Kansas City, Mo., chairman; Dr. A. G. Gumaer, Buffalo, N. Y.; Dr. W. R. Blakesly, Forest City, Pa.

Respectfully submitted,

W. B. ROGERS, *Secretary*.

GEO. ROSS, *Chairman*.

It was voted that the rules be suspended and that the secretary be instructed to cast the ballot of the association for the adoption of the report as a whole, except that portion pertaining to place of meeting. The secretary then cast the ballot of the association for the various officers nominated and they were declared duly elected.

The next place of meeting was then discussed. Some of the mem-

bers favored Omaha, others Hot Springs, Va., the discussion being participated in by Drs. Roe, Brock, Stemen, Morton, King, Reed, Thorn, Galbraith, after which, on motion, Hot Springs was selected without much dissent.

Dr. Cole said that such a change necessitated the appointment of an assistant secretary in the place of Dr. Bryant of Omaha and the appointment of a new committee on arrangements. He therefore moved that the matter be re-referred to the committee on nominations. Carried.

Dr. Roswell Park of Buffalo read a paper on "Tetanus."

TETANY—TETANUS.

Though tetanus and tetany are not merely similar in name, but present many characteristics which might lead to mistaking one for the other, there is, nevertheless, such a wide etiological difference between them that a clear differentiation is of the greatest importance, not merely for the sake of accuracy, but for the credit of surgery and the welfare of an important class of patients, *i. e.*, those suffering from enlargements of the thyroid.

Both occur as sequels of operative interference, and if tetany is so infrequent as never to be seen by some, it may be experimentally produced and studied almost at will.

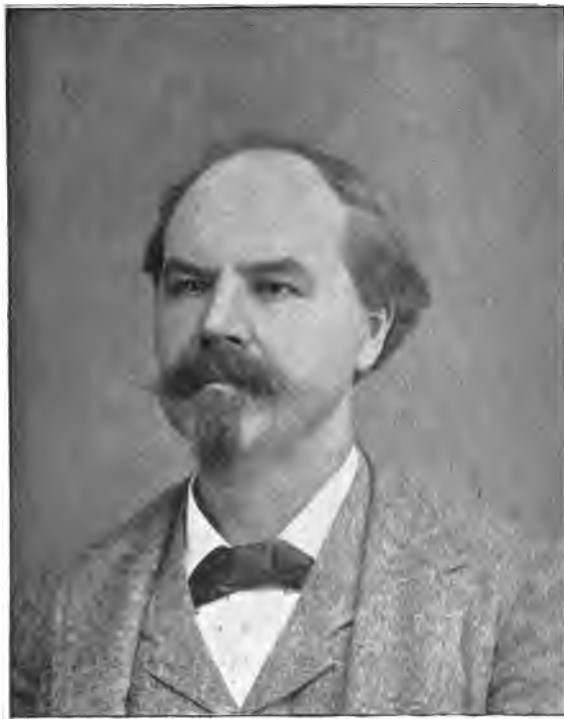
Tetany may be described as apparently a neurosis, manifested especially by tonic spasms, particularly of the extremities, and an increase of mechanical and electrical excitability of peripheral nerves. It is pathognomonic of the disease that these spasms may be produced by compression of one of the great arterial or venous trunks.

It was described first by Corvisart and Trousseau, and then more fully by Erb and Chvostek. It occurs spontaneously in less severe form in pregnant and nursing women, in children after exposure to cold, or after such intestinal lesions as may be produced by typhoid or by parasites; also among young apprentices to certain trades. It occurs also in endemic or epidemic form. But what interests us most here is that it sometimes follows certain operations, and extirpation of the thyroid in particular, and then constitutes so serious a complication that a large percentage of patients succumb.

It has been described under various names besides tetany, as *e. g.*, tetanella, idopathic muscular spasm, carpo-pedal cramps or spasms, etc. It is certainly a functional neurosis, comprising spasms of muscles in a pretty regular order or rhythm. Patients do not lose consciousness.

It was considered by Herz to be due to spinal anæmia, while Jacobi, on the contrary, attributes it to meningeal hyperæmia, and Gowers explains it on the hypothesis of a primary lesion in the primary cells of the cerebro-spinal tract. While it is certain that its pathology and symptomatology are still obscure, it will be seen shortly that a notable advance in its experimental study has been recently made.

According to Weiss (*Ueber Tetanie*, "Volkmann's Samml. klin. Vort.," No. 189), it was noted as a post-operative phenomenon in Billroth's clinic. Later it was noted and remarked upon by Schonborn, Albert, Nicoladoni, Mikulicz, Gussenbauer, Corley, Szuman, Kocher, Kothman, Higgnet and others, and has recently been made the subject of a careful experimental study and an elaborate essay by



VICE-PRESIDENT B. F. EADS, M. D., MARSHALL, TEX.

von Eiselsberg (*Ueber Tetanie in Anschlusse an Kropfextirpation*, Vienna, 1890), to which I am greatly indebted, and from which I have largely drawn.

The most striking characteristic about tetany is the peculiar severity or malignity which it exhibits when occurring as a sequel to thyroidectomy. Thus Eiselsberg refers to twelve such cases in Billroth's clinic out of fifty-three total extirpations, of which eight died, while in two the disease assumed a chronic character, and only two finally recovered. To its severity and its fatality is largely due the unfortunate confusion of terms and clinical pictures, by which so many deaths after total extirpation of the thyroid have been described as due to tetanus. It is of importance, then, to differentiate accurately between the two diseases.

The symptoms of post-operative tetany may supervene almost immediately after the effects of the anæsthetic have disappeared, or may be delayed so long as ten days. Usually prodromal symptoms give warning of what is coming; such as malaise and a combination of muscular weakness, with a sensation of muscular stiffness. Sometimes these sensations are quite absent and the outset of the disease is equally violent and surprising. Two signs which may be usually early elicited are so characteristic, so diagnostic, that they deserve great emphasis.

The first is Chvostek's. A slight tap upon the side of the face, over the point where the facial nerve emerges from the parotid, suffices to call forth a sudden spasm of that side of the face. The second—Trousseau's—is the spasm of an extremity, which may be produced by compression of its principal blood or nerve supply for a brief period of time, from a few seconds to a few minutes. The first sign is easier of production, is elicited without detriment to the patient, and is pathognomonic; while the second is of no greater value, and may be followed by pain, and its frequent repetition certainly does serious harm to the patient.

The muscles of the face are those commonly first affected; then those of the upper extremity; they are always more marked in the arms than the legs, and sometimes the latter seem to escape. The position of the hands and fingers is usually that seen in cases of irritation in the course of the ulnar nerve; the elbow somewhat flexed, the hands flexed to the ulnar side, the fingers bent at the metacarpophalangeal joints; thence straight and stiff, the thumbs bent into the palms. This position of the hand and fingers is not invariable nor pathognomonic, but is that usually seen. Sometimes the fist is doubled up with the thumb between the first and second fingers. The muscles of the forearm are hard, and sometimes a little tremor may be perceived. It is always difficult to overcome the muscular spasm. In severe cases the hands are usually held with their backs pressed together. When the lower limbs are affected the legs are usually stiffly extended with strong plantar flexion of foot and toes. With all this muscular spasm there, is more or less pain in the affected parts, with temperature usually considerably elevated. Such attacks may last from two to fifteen minutes or more, but they do not occur with nearly such frequency as the convulsive seizures of true tetanus, and it will be seen that there are other wide differences in the onset and march of the two diseases.

Nevertheless, in the most severe form of tetany there may be such contortion of the facial muscles as to resemble the "Sardonic grin," and which would, of course, destroy the significance of Chvostek's sign. Tonic cramp of the abdominal muscles is not unknown, especially of the recti, and one may even see a certain degree of opisthotonos.

Dyspnoea may be caused by spasm of the diaphragm or thoracic rigidity, and cyanosis may be the result of cervical spasm. In some cases the patients give shrill cries; others speak with great difficulty. Deglutition is sometimes difficult.

Finally in the gravest cases consciousness is lost; and usually at such times spasm relaxes. Death never occurs in the height of the disease, usually hours or days later.

Autopsy gives only negative findings; only twice Weiss found some slight disturbance in the gray matter of the anterior horns in the medulla.

Some peculiar features have been noticed in individual cases. Thus in one of Billroth's cases the patient was four months pregnant at the time of the thyroidectomy. Normal delivery at term was in no wise interfered with although for *nine years* she suffered from tetanic seizures, during which Chvostek's and Trousseau's signs could also be easily evoked. For the latter a very brief compression of the ulnar nerve sufficed. Overwork or excitement, particularly in cold weather, seemed to precipitate these attacks. Her temper appeared less equable than before the operation, and she was at times found almost uncontrollable. Before the operation, too, she had suffered spontaneous loss of hair and nails; these were afterward as spontaneously restored.

Another and younger woman recovered, but long remained subject to mild attacks, which occurred much oftener in cold than in warm weather. After a couple of years she had no seizures properly speaking, but the phenomena described by Chvostek and Trousseau could be elicited at almost any time.

Weiss has described (*Allg. Wiener Med. Zeit.* 1885, No. 37) an atrophy of those groups of muscles most involved in the spasms, as a sequel of tetany, though not of that observed after thyroid extirpation. So also falling of the hair has been noted by Kocher (*Arch. f. klin. Chir.* 1883) as an accompaniment of cachexia strumipriva, and by English writers among the symptoms of myxœdema.

In one of the marked fatal cases, and in two of the others, a great temporary improvement was noted after a profuse sweating. Whether this might be of service as a hint in the therapeutics of the affection is a question worth considering.

It will be noticed that all of Billroth's twelve cases were females. Of the eight fatal cases, as detailed by Eiselsberg, I have tabulated the following information:

Age.	Attack Began, Days After Operation.	Lived How Long, After First Attack.
12	Fifth.	Three months.
18	First.	Three days.
39	Tenth.	One day.
64	Ninth.	Eight days.
17	Second.	Seven months.
23	First.	Three days.
36	Fourth.	Four days.
32	First.	One month.

Though so rare among males, the disease is not unknown among them, since Mikulicz has reported two cases and Higgnet one.

No treatment seemed to be of avail, and nothing seemed to mitigate the intensity of an attack. The internal use of chloral with the subcutaneous exhibi-

tion of morphia seemed most satisfactory. In view of a remark made above, I would suggest the expediency of trying pilocarpine as a diaphoretic.

When these and similar cases are critically studied, it appears that their ætiology is inseparably connected with the total removal of the thyroid. They were in no wise nor remotely septic. In the eight fatal cases above alluded to, only once was there the slightest suppuration in or about the wound. So with the cases reported by others; wound disturbance of any kind was the rare exception. To be sure, in the very few cases reported where pus had collected in the wound, the violence of the symptoms increased, but pressure upon the scar at almost any time would have the same effect; and in other cases it was noticed that a constrained position in bed affected one patient in the same way, and in another, apparently about recovered, a warm bath precipitated a violent attack.

Injury to the recurrent laryngeal nerve does not explain these cases, since this nerve is practically always injured in these operations. We are confronted with the following most significant figures: After fifty-three total extirpations it occurred twelve times; after eleven partial extirpations it did not occur at all. It has occurred twice, once to Szuman, once to Billroth, to see mild cases of tetany after nearly complete removal of the thyroid body. The inference, then, is unavoidable that in some way, not yet understood, the removal of the thyroid brings about the curious phenomena collectively termed tetany. *How or why* this is the case is a problem to be solved—if at all—only by experiment. This is made the more difficult by lack of exact knowledge of its function.

The names of A. Bardeleben, Schiff, Zesas, Colzi, Wagner, Albertoni and Tizzoni, Sanguiricci and Canalis, Fuhr, Munk, Horsley, Carle and others less well known, have heretofore figured prominently in researches upon this organ. As the result of their labors it has been pretty well settled that in cats and dogs removal of the healthy thyroid provokes a constant diseased condition which is fatal; while sheep, rabbits and rats tolerate it without harm. Further, when it is made a *deux temps* the symptoms only appear after removal of the second half. Extirpation of a lateral half only is seldom provocative of disturbance, while Wagner, Horsley and Rogovitch have seen a compensatory hypertrophy of the remaining portion. (Vid. Sutton's "Dermoids," p. 83-4.)

Schiff went further and experimented with transplantation. It is now known that this peculiar organ, or ductless gland as it is often called, possesses the peculiar property of usually first quickly contracting adhesions in any new tissue in which it may be placed, and then later of establishing for itself an adequate vascular supply with, presumably, more or less restoration of its function.

Schiff claimed that when an animal, into whose peritoneal cavity the thyroid of another of its own species had been transplanted, subsequently had its own thyroid totally removed it did not develop these peculiar symptoms. But these results claimed by Schiff have been positively denied by others, and certainly need confirmation. At all events it seems pretty clear that dogs and cats very seldom survive removal of the entire thyroid, and that in those who do accessory thyroid bodies are found. It was Fuhr who especially determined this matter, to disprove the claims of Kaufman and Tauber; and he further showed that no amount of irritation of the recurrent nerve sufficed to provoke tetany—only total thyroidectomy would produce it. Horsley has shown that virtually the same obtains in the case of monkeys, who develop tetanic symptoms and fall into a condition of myxœdema, in which mucin is found in considerable quantities in certain tissues and in the blood.

In order to better determine the influence of the thyroid relative to these

peculiar nervous phenomena Eiselsberg made experiments on a series of 100 cats, having selected this animal because it seems to be free from accessory thyroids whose presence, by subsequent compensatory hypertrophy, might vitiate the results.

In one series he made total extirpation seventeen times. Only once did suppuration occur, the other sixteen wounds healing *per primam*. All these animals developed tetany; the youngest displaying its characteristic signs almost immediately after awakening from the narcosis, the others in from one to three days. All died of the disease. The symptoms in animals consist of tremors and muscular spasms which show themselves particularly as the creatures rise from the recumbent position or still more from the dorsal. Dyspnoea is frequent. Then tonic spasm of the extremities supervenes, and this can be produced almost at will at tapping the limb over the greater nerve supply. During pauses they are usually quiet and apathetic. They usually die in spasm. The course of the disease is usually about a week, but it may be fulminating and kill them in a day. Loss of appetite and rapid emaciation are conspicuous. The act of deglutition frequently provokes an attack. Free flow of saliva is often noted; during this there is sometimes temporary improvement. The limbs often assume rigid positions, reminding one of catalepsy.

Nine times total extirpation with transplantation was tried—once under the skin of the neck, twice under that of the belly, twice between muscles, twice in the peritoneum, and twice as Schiff did it. Seven times out of nine these wounds healed *per primam*. All nine died of tetany.

In 1887 Ewald reported (*Ber. klin. Wochschr.*, 1887, No. 11) that after hypodermic injections of thyroid juice into healthy animals, some disturbance—lasting one—two hours—was produced. But according to Horsley this has no different effect from other tissue juices which contain some fibrinogenous poison. With this in mind Eiselsberg made five total extirpations, after which a strong extract of the thyroid was injected under the skin, without any apparent effect. In two other animals he substituted a small dose of morphia, by which both animals were made more quiet, but all seven died of tetany. He then tried a fourth series of sixteen, extirpating only a lateral half. Two animals died of infectious pneumonia, the other fourteen all recovered, without any appearance of tetany. In eleven others the extirpated half was transplanted into the peritoneum, with the same negative result.

Twice he followed Schiff's experiments, and extirpated first one-half and then the other, transplanting the second half into the peritoneum, and both animals died of tetany. Nine times this experiment was so varied that *the first half* removed was transferred, while the other half was extirpated from three to twenty-one days later. Eight of these animals showed perfect wound healing, but died of tetany; only one of these, an old and large animal, with a period of three weeks intervening between the two operations, recovered without disturbance.

These results correspond exactly with Carle's obtained on dogs. In four of this last series of nine cases it is noteworthy that between the first and second operations a considerable hypertrophy of the undisturbed half had taken place, and when this second and enlarged half was taken away, in each instance the tetany was of the fulminating variety. Only once out of four other cases in which the first half was transplanted between the peritoneum and its overlying fascia, did perfect fixation and organization—i. e.: vicarious restoration of function (?)—take place; the other three died of tetany.

Seven other experiments, by which more than half of the total thyroid mass

was removed, seem to demonstrate that when four-fifths of this body is taken away, tetany is the almost inevitable result. In sixteen other animals vascular exclusion of the thyroid was made by ligation of all its vessels. All of these developed tetany, and all but four died of it; the four gradually recovered. When the two halves were thus excluded at intervals of six weeks, there was no apparent effect.

These numerous experiments certainly seem convincing, though the obvious inference is not in accord with the views of Munk and Drobnik, who are disposed to regard the tetany as due to irritation in and about the wound upon the large nerves closely adjoining, and who ascribe to suppuration the *role* of being the irritant factor. It will be seen that 87 per cent. of wounds in those animals which Eiselsberg operated upon healed without suppuration, and that this union *per primam* did not seem to interfere with the onset of tetany. Moreover, Horsley, Fano, Ewald and Well have abundantly shown weaknesses in Munk's chain of argument, and have apparently disproved his contradictory statements, showing the fallacies of his reasoning and the inaccuracy of his methods.

Although it takes us away from our primary subject, which is rather a discussion of the ætiology of two diseases presenting certain points of resemblance yet widely different in pathogeny, still we may with profit consider for a moment what relation tetany, following thyroidectomy, bears to myxœdema and to cachexia strumipriva, following the same procedure. The two latter are eminently chronic maladies, while the former is essentially acute. We are largely indebted in this consideration to the Myxœdema Committee of the London Clinical Society (Appendix to their Trans., 1883), and especially to Horsley's experiments upon apes. This investigator saw sometimes a rapidly fatal tetany, which has been spoken of as acute experimental myxœdema, while in other cases there developed slowly the well-known signs of the common form, depending very largely upon the temperature at which the animals were kept, since the colder the environment the more quickly they died, and with more acute symptoms. In the first stage of myxœdema there is a marked increase of mucin secreted by the salivary glands, intestines and bladder, while on autopsy it is found in the blood and in abnormal quantities in certain tissues. The influence of temperature is beautifully demonstrated in an instance reported by Horsley. A sheep underwent total extirpation, and remained apparently well for twenty months; he was then, after shearing, exposed to cold, after which he developed acute symptoms and died a typical death. From all of which it appears that tetany and myxœdema are, as it were, interchangeable diseases; dependent on the same causes, differing only in march and course. It follows from this that the thyroid is an organ not only of peculiar function, but that it is one of the most indispensable parts of our bodies. Of several hypotheses which have been advanced to account for its peculiar importance, that which seems best to explain the facts, and, indeed, perhaps the only one tenable, is that it has to do in some way with the transformation of mucinous substances which when allowed to collect in the system certainly are injurious and even fatal. As corroborating this view, we know a peculiar bronchial catarrh which these patients occasionally present, with its tenacious mucinous secretion; further, that with the subsidence of this elimination the disease is commonly augmented.

Furthermore, that with profuse salivary or sudoriparous excretion amelioration occurs, and that when excretion is hindered, as by cold, the symptoms are at once changed for the worse. It appears that by such symptomatic discharges the flooding of the organism with mucin is prevented. Finally, the very common

colloid, or, more exactly, mucoid degeneration of the thyroid body, has a significance which must not be overlooked; as if, according to Eiselsberg, when this organ can no longer bring about the proper conversion of mucin (or its allied substances) it collects it in reservoirs in the shape of colloid material, which is, at least, difficult of resorption, and so keeps it out of the economy.

These views gain credence also from the undeniable fact that excess of mucin is poisonous to the system, and this has been beautifully demonstrated by Wagner. He injected mucin which had been carefully extracted from the salivary glands of cattle, into cats, and produced thereby typical tetany.

The occurrence of idiopathic tetany appears to have much to do with meagerness of diet or improper nutrition. Neusser has called attention to a certain similarity between pellagra, as he studied it in Austria and Roumania, and epidemic tetany among school children. Each appears to be in no small measure an auto-intoxication brought about by unwholesome food. Most interesting and important in this connection is Gerhardt's discovery that tetany sometimes follows dilatation of the stomach, with its train of fermentative mal-digestive disturbances.

Obviously, certain difficulties present themselves in accepting these views. Why should certain animals display so violent manifestations after thyroidectomy, while other species or genera are scarcely or not at all affected? Why should the carnivora belong to the former class, and the herbivora to the latter, as to a large extent they do?

Beyond stating that the herbivora appear to be exempt from the acuter manifestations, we can give no answer to such questions unless it be found in the nature of their diet. It is of interest here that at least one patient who made a good recovery after thyroidectomy noticed a notable change in his own appetite, since he reported to Eiselsberg that he had lost all wish for meat and had become a vegetarian (*loc. cit.* p. 35, note).

Another query naturally arises here. Why do some persons to all appearances completely recover after thyroidectomy, while others succumb quickly to acute tetanic manifestations, and yet others fall into the most sad condition of myxœdema? As yet this can only be partially answered. Yet it is known that in youth the thyroid plays a more important part than in later adult life. It is also quite sure that when we attack the thyroid it is because it is no longer in a physiological but a pathological condition, and when we draw inferences between clinical experiences and experimental results we must bear this in mind. Moreover, it appears safer, so far as the disease at present considered is concerned, to remove a cancerous thyroid than a goitre. Moreover accessory or supernumerary thyroids are frequently found, often at points where they are difficult of recognition, as behind the larynx, at the root of the tongue, etc., and when present they can of course assume an importance begotten of necessity. To this I might add the possible assumption of function, in certain cases, by such correlated tissues as the tonsils or other lymphoid tissues, or possibly even the bone marrow, although nothing definite is yet known upon the matter.

Although it bears little if at all on the pathology of tetany I deem it quite advisable here to introduce a very brief notice concerning some recent and very important studies concerning the curability of myxœdema, taken in the main from a recent note in the "*Therapeutic Gazette*" (October, 1890, p. 718).

Early in 1890 Mr. Horsley suggested that the disease might be cured by transplanting healthy thyroid tissue into the bodies of patients thus suffering. But it appears he was forestalled in the idea by Bircher, who related certain valuable results obtained by this method. He described an acute case in a female patient from

whom, unintentionally, the whole gland had been removed. Severe symptoms supervening, Bircher in January, 1889, transplanted into the abdominal cavity a portion of an apparently normal tissue from a goitre. The immediate effect was very happy and the patient returned to work. Three months later, however, it became evident that the transplanted portion had atrophied, as myxœdema again appeared and progressed. A second transplantation was then made with more lasting improvement, as the patient remained fairly well for nine months. At the time of writing the symptoms had returned in very mild degree, but the beneficial effect was established indubitably.

In the "British Medical Journal" for July 26, 1890, Horsley reports that he had recently learned from Kocher of Berne, that he attempted to obtain the same effect in 1883, by the same method, but that the graft was too soon absorbed. Further, that after hearing of Bircher's success, Kocher took up the subject again, in 1889, by transplanting, in two cases, half of a thyroid body into the abdomen, fixing it to the wall by sutures. In each case the gland was, after a time, "aseptically exfoliated." Then in three cases he put the gland loose in the abdominal cavity. The final results of these cases have not yet appeared, though at least one was greatly improved.

From these considerations Mr. Horsley thinks that the operation should be performed not only in cachexia strumipriva, but also in myxœdema and sporadic cretinism. But whether the transplanted gland tissue may better come from a human being or from an animal remains to be decided.

There is perhaps no *terra incognita* in physiology in which ingenuity of research and painstaking study may be better rewarded than that outlined in these few remarks upon tetany. It is a field wherein the interests of the pathologist, the clinician and the operating surgeon are common property, and he who properly harvests the seed already sown there may prove a benefactor to his race.

Ethiologically the subject of tetany has nothing to do with that which must next engage our attention, namely, tetanus. Yet, clinically, they appear so closely related that those that ought to know better confuse them. Thus, I was informed, while abroad last summer, by a more than ordinarily intelligent physician that a well-known European surgeon had lost so many patients from tetanus after removing the thyroid that he had been virtually forced to give up such operations. It required some pains to elicit the facts in the case, which simply were to the effect that he, like some others, had become discouraged on account of the proportion of cases which developed *tetany* after total extirpation of the thyroid. There would seem, then, to be no impropriety in proceeding at once to a consideration of some of the features of tetanus.

TETANUS.

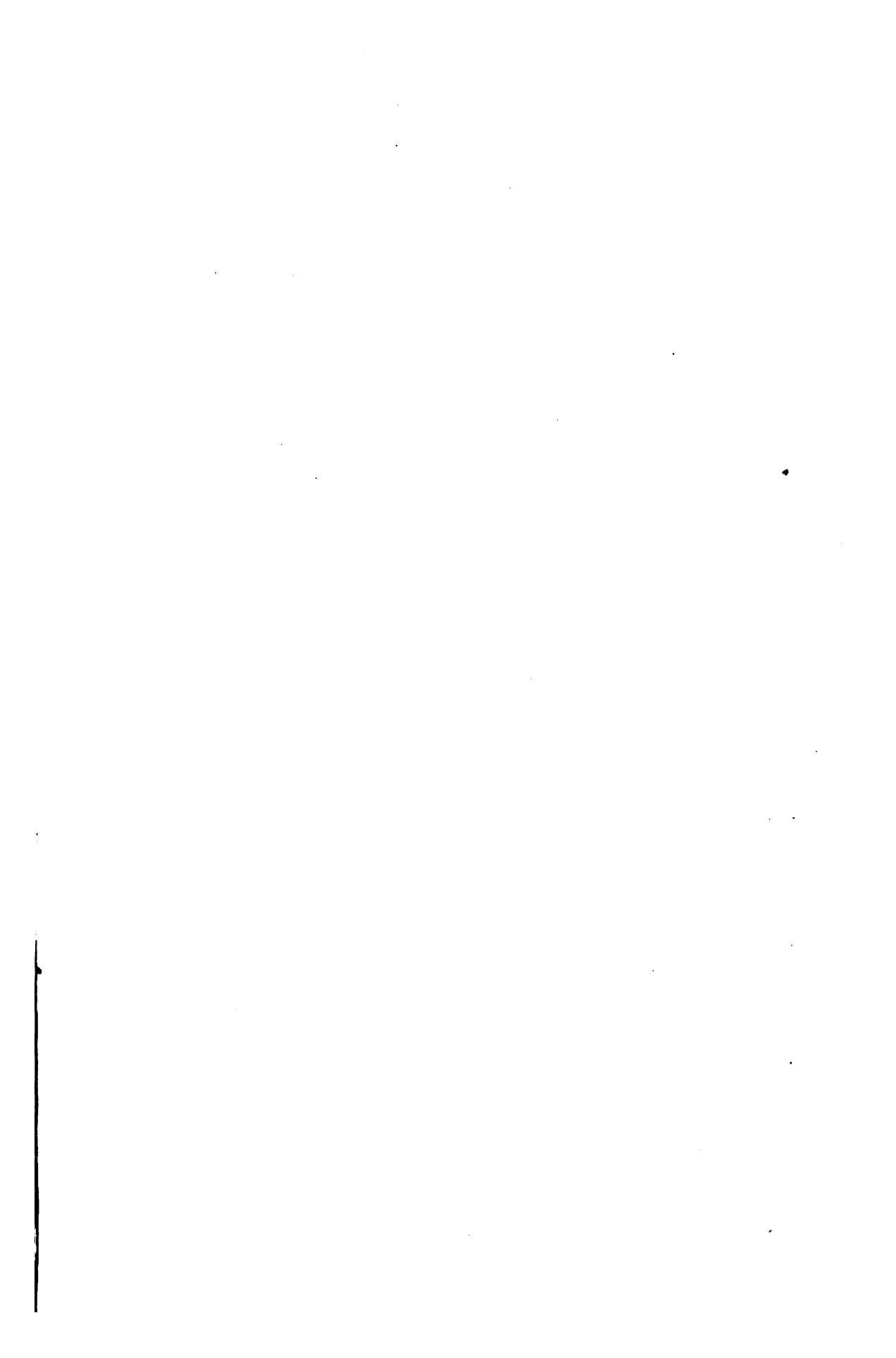
Unlike tetany, tetanus is referred to in the oldest annals of medicine. One may find in Hypocrates, Galen and Celsus at least some indication of its principal symptoms, but its precise clinical history commenced with the end of the previous century, with the observations of Bajou and the grand work of Heuteloup which gives an excellent resumé of the knowledge of his time. Fournier-Pescey extended this knowledge and showed the possibility of recovery. During the wars of the Empire clinical facts multiplied and we were given the accurate description of Larrey. It has remained for the second half of our own century to clearly discover the etiology and pathology of this disease.

Following the example of Richelot, in his thesis of 1875, and of Mathieu, in his article in the Encyclopedic Dictionary, we must speak successively of the

wounds, the wounded and the environment. First of all, any wound may present this complication, but some predispose more than others. The point of injury makes some difference. Wounds of the extremities, of the hands especially, seem more often to determine trismus than any others. Thus for Poland and for Yandell more than one-half the cases are due to traumatism of the extremities. The character of the wound has been alluded to by authors as occasioning a predisposition. Thus gun-shot wounds, especially the lacerated and contused, and next perhaps the injuries received from machinery, seem to be the most grave. The most cleanly cut wounds seem to be the least often infected, although tetanus in the past has, not rarely, followed amputations. On theoretic grounds, referring to the parasitic origin of the disease, it is not difficult to understand why it should more commonly follow ragged wounds. Burns, whether accidental or provoked by the actual cautery or by chemical substances, and frost bites, whether superficial or deep, have also caused the disease, and, as is well known, it frequently follows ligature of the umbilical cord in the new born. The extent and depth of the wound are features without importance. The prick of a needle, a hypodermic injection, the bite of a serpent, the penetration of a thorn, the extraction of a tooth, piercing the ears for ear rings, vaccination, dilation of the nasal canal, the removal of an in-grown nail, and other equally trivial accidents or operations have been followed by the disease. In the past such operative measures as the constriction of a nerve in a stump, or the ligature *en masse* of the spermatic cord, or of the pedicle after ovariectomy, have been forbidden for this reason.

The presence in the wound of foreign bodies, of bullets or fragments of weapons, of thorns, of needles, and of any other small foreign particles, seems to predispose toward the disease. It has been generally supposed that an actual break of the surface by which air might be admitted was a prerequisite for the manifestations of tetanus, but evidence is very strong that this is not absolutely necessary. The well-known case of Morgagni in which it followed a contusion of the back, and such a case as that reported by Verneuil, where it was apparently produced by a violent effort to prevent a fall, as well as cases reported by Bouchut, Macleod and others, put this all beyond a doubt. Closed fractures and small luxations or dislocations have likewise been followed by tetanus. A case has been reported by Richelot in which it followed the dislocation of a finger, and in which dissection revealed the nerves stretched over the dislocated extremity of the phalanx like violin strings. Such cases, therefore, are not so very rare. Out of 121 cases observed by Wallace, in the Indies, thirteen were of this character. Here also may be properly emphasized the fact that it may not occur until after cicatrization of a wound. Thus Cooper, Annandale, Larrey, Langenbeck and others have reported incontestable cases of this kind. I have myself seen, in consultation with Dr. Norton, then of Buffalo, a case of tetanus which resulted fatally, and which followed some weeks after complete healing of a tarsectomy wound, in an adult, made for the relief of club foot. The patient had so completely recovered as to be up and about his work, when he was suddenly seized with the unmistakable symptoms of the disease.

The wounded individual is more or less predisposed according to circumstances of race, sex, age and constitution. The colored race are always more liable than the white. The negroes, Hindoos, Malaysians and the islanders of Tonga and Fiji show a particularly unhappy disposition. That negroes are particularly liable was abundantly shown during our Civil War, and that the inhabitants of warm countries seem the less resistant is shown by the fact that in various European wars the Italians and the French have suffered more than the





VICE-PRESIDENT JOSEPH CARTER HEARNE, A. M., M. D., HANNIBAL, MO.

Russians and the Austrians. One ordinarily speaks of tetanus as a disease of adult life, yet infants are by no means exempt; and in the tropics the trismus of the new born has caused a high rate of mortality. It was said by one plantation owner that fully three-fourths of the infants born upon his plantation succumbed to the disease. In Jamaica, according to Fournier-Pescey, a quarter of the new born negroes succumb within eight days after their birth, and in Mexico and in Senegal the proportion is at times equally great. The ulceration around the ligature of the cord, or the little wound inflicted during the rite of circumcision, are the common causes of tetanus among these new born, although it must be admitted that their detestable hygienic surroundings and their excessive poverty are contributing causes.

Men are attacked much more commonly than women, doubtless because their occupations expose them to more injuries, especially in war, males being commonly ten times as liable, according to some of our best authorities,—except where climate, as above noted, especially predisposes. This difference is the more remarkable since parturition with its difficulties, and sometimes the necessary operative interferences, should make the disproportion less striking. In fact, much less serious injuries in the female have been followed by this disease. Thus, it has been known to follow amputation of the uterine neck, dilation of the cervical canal by sponge tents, removal of polypus and ovariectomy.

Military surgeons have generally insisted that the mental and constitutional condition of patients figured largely in the etiology of the disease. Soldiers when worn out by fatigue or suffering from the disgrace of defeat or with their emotions vividly affected from any cause, are apparently more liable to the disease. The excitement of a sudden call to arms, of sudden discharge of cannon, even the whirring of bullets during the night, have been said to cause a shock which appeared to determine an invasion of the disease. Sill, in 1870, says Mathieu, the besieged in Strasburg, Metz and Paris were affected with emotions even more vivid than those of the besiegers, and yet these last suffered more from tetanus; and thus after Waterloo the allied armies were less attacked than were the French, and so too in our Civil War not a single case was reported in the Confederate army, while the Federal troops lost 505 men from this source. Furthermore, those with visceral disease seem to be more subject to the disease. Malaria has also been supposed to be a contributing cause.

The influence of the environment is by no means the least interesting factor in the present consideration. The effect of climate is indisputable. Tetanus is *par excellence* a disease of hot countries. Guinea, Antilles, Senegal, Ceylon and Java have a reputation above all others. Military statistics show the same thing. In 1813 in Spain the English suffered in the proportion of one case of tetanus among eighty wounded men. In the East Indies in 1782 this proportion was doubled. In the war in Morocco there was one case of tetanus to 920 hospital patients of Spanish, and one to fifty-six of African birth. Apparently it is not heat alone which determines this intensity so much as the combination of heat and humidity; still, quick variations of heat and cold, such as warm days and cold nights, seem to exert a great effect. The sudden fall of temperature after the battles of Dresden and Bautzen, according to Larrey, caused a large number of cases. The electrical disturbances which accompany violent thunder storms seem to exert an influence, as do also cold winds saturated with moisture, like those which come from off the sea or sweep down the valleys of large rivers. Curiously enough the wounded who have been cared for in churches have suffered more from this disease than those cared for in any other way. After the battle of Jena tetanus

attacked especially the wounded who had been carried into churches. In 1870 after the battle of Sedan it was those who were thus cared for during the combat and the following night who were mostly attacked.

Verhoogen and Baert have recently published a memoir, dedicated to the Royal Society of Medical and Natural Sciences of Brussels, in which they cite at some length the endemic character of the disease in warmer climates, and in which they show the occasional epidemic character of the affection in man and even in some of the lower animals, and they cite as among the most startling evidences of this character the remarkable experience of Thirlar. He was unfortunate enough to lose by tetanus ten cases of major operations before he determined the source of the infection to exist in his hemostatic forceps. So soon as he thoroughly sterilized these by heat he had no further undesirable complications. If the disease can be so easily conveyed by instruments, the same is true of a midwife's scissors, and these latter may well be the cause of the terrible fatality of tetanus neonatorum of these same climates. These writers call attention also to the indefinite symptoms preceding the outbreak of the attack; the fever, the occurrence at times of epistaxis, the existence in many cases of a cutaneous rash resembling that of erysipelas, to the symptoms of kidney disease and the changes occurring in the kidneys, and the enlargement of the spleen, as being all characteristic of the usual course of infectious disease.

The term *tetanus hydrophobicus* or *cephalic tetanus* has been applied to a somewhat peculiar manifestation of the disease first described by Bernard and Lepine. When the injury by which the disease is provoked is located near the parts supplied by the cranial nerves the facial nerve has been supposed to be affected upon the same side; the lightest disturbance causes painful spasms of the neighboring muscles involved, and the pharynx and larynx, being virtually supplied by these nerves, when thus involved are so affected as to produce an intense dysphagia, with spasms of the glottis upon any effort to swallow even fluids; whence its misleading name of *tetanus hydrophobicus*. The poor patient suffering from these painful muscular spasms, which are provoked even by the sight of water or the thought of taking anything within the mouth, cyanosed, with spasmodic dyspnoea or temporary apnoea, presents a picture conforming well to the type imagined by the laity as that of a person in the last stage of hydrophobia.

Brunner has very recently experimentally studied this phase of the disease anew. He has determined that, in animals at least, the peculiar appearance of the face is due not to facial paralysis, but rather to a tonic tetanic spasm of muscles. This was made the more evident by a section of the facial nerve after appearance of this condition, whereupon it subsided at once. This is unquestionably the case also in patients thus affected, since it is impossible to understand how the parts supplied by the facial should be paralyzed while those supplied by the pneumogastric and hypoglossal should be thrown into violent spasm. (*Deut. Zeit. f. Chir.*, xxx.)

With regard to the etiology of tetanus, two theories have in the past had their strong advocates, or perhaps, to express it more accurately, the explanations that have been offered in the past can be best grouped under two distinct headings, as, first, the nervous theory, and, second, the humoral. The significance and intensity of the principal phenomena of tetanus have always pointed us so distinctly to the nervous system as the most active agent in the production of the disease, that it is not at all strange that the primary irritation has been located in some part of this system. Under this heading, however, must be ranged such explanations as that given by Forbes, who attributed the poisoning to a successive production of creatin and lactic acid, in consequence of exaggerated tissue degeneration; this latter he considered due to excessive nervous activity, and this last he left unexplained. Such an hypothesis as an ascending nervous irritation due to lesion of the peripheral nerve filaments is, perhaps, the simplest that would offer, and has had numerous adherents in the past. Besides this, there have been many who regarded the disease as due to an excitation of the spinal cord, and by this have explained the increased temperature, the tendency to asphyxia and some of the other phenomena

peculiar to tetanus. According to Brown-Sequard, it is a pathological reflex having for its point of departure a peripheral nervous irritation, causing an undue functional activity in the superior portions of the medulla, which is followed by muscular contractions and elevation of temperature.

So far as the microscopic changes in tissues are concerned, there is much difference of opinion among authors. Rokitsansky and Demme have discovered changes in the neuroglia of the white matter in the spinal cord, which, however, Leyden does not consider to be pathological. Other authors like Clarke believe in congestion and softening of the gray matter, Dickinson in changes in both white and gray matter, while Lepelletier thought to have discovered a peripheral neuritis in these cases. The most exact observation of the nervous system of patients dying of tetanus, as well as of animals in whom the disease has been produced, do not reveal any changes, either in the central nervous system or in the peripheral. Nevertheless the whole course of the disease indicates a slow spread along the course of these nerves. The poison, whatever it is, probably reproducing itself in nerve substance spreads slowly toward the spinal cord, there to manifest its strongest activities. Elevation of temperature is by no means constant in experimental animals. It is seldom manifested. The exaggerated frequency of pulse is ascribed to a paralysis of the vagus.

On the other hand, the humoral theory has had its defenders, who have found plenty of facts upon which to base their views. According to these the alteration of the blood, which they have considered the exciting cause of tetanus, has been compared to poisons with various alkaloids, many of which are known to exert a selective influence on various organs or tissues. Defended especially in the past by Simpson and Travers, and more recently by Roser and Billroth, it supposes a specific toxæmia of the system, the unknown poison exerting a selective influence upon the nervous system. Others have regarded it as a toxæmia, due to poison generated directly in the wound, or to an autochthonous septicæmia, due to a sudden suppression of the functions of the skin and the failure to eliminate its excretory products. The poison was supposed to be a chemical one, formed in the wound or near it, and thence absorbed into the blood. If this hypothesis were true we should have an evolution of the disease analogous to that of purulent inflammation. Quite recently, and in accordance with the tenets of the germ theory, the idea of a purely chemical poison has been abandoned, and the chief role assigned to micro-organisms. Before the parasitic nature of the disease had been carefully recognized, Lister furnished a comparative proof of the truth of this hypothesis by showing how in six years under the antiseptic method he had met with but two cases of tetanus, and these in wounds already septic.

Others yet have charged it with being distinctly a zymotic disease, which view had much in its favor, except the fact that until recently inoculation experiments had failed. Of course while each particular hypothesis under both the above headings had more or less in its favor there were objections which were fatal to each except the last. For this last, namely that of zymosis, there were many corroborative facts, such as the statistics from the Dublin Lying-in Hospital, where there was at one time an epidemic of tetanus neonatorum, the mortality rate within the first fortnight being 17 per cent., which was reduced to 5 per cent. after a better ventilation was established.

It has remained, however, for living observers, working within the past decade to establish clearly the parasitic nature of this dread disease, and to isolate and investigate the organisms by which it is produced. In 1884 Carle and Rattone inoculated rabbits with an emulsion formed by macerating in distilled water a fragment of skin taken from a subject dying of lockjaw. Their results were positive. From them they concluded tetanus to be an infectious disease, but they could neither see nor cultivate the micro-organism which caused it.

The mere establishment of this fact was a very distinct advance in our knowledge of the natural history of the disease, and though some of their statements with regard to the biology of the micro-organisms which cause it are hardly to be

accepted we, nevertheless, owe the above demonstration to them. During the year following Nicolaier demonstrated that in the ordinary soil of our gardens and streets there are bacteria which, when introduced under the integument of mice, guinea pigs and rabbits, produce a typical tetanus with fatal termination. Inoculations made with dirt from the streets of Berlin, Leipzig and Wiesbaden gave the same results. Soon after this Rosenbach demonstrated to the German Congress of Surgeons (in 1886) that the same bacillus which Nicolaier described appeared in human tetanus, and soon after this his observations were confirmed by numerous observers.

In his communication to the Congress of Surgeons, Rosenbach first called attention to the fact that experiments had been made in a promising direction by Rose Frickenhaus and by Arloing and Tripler, and that the latter had experimented in 1870 by injecting dogs and rabbits with blood and pus from tetanic patients, and has also vaccinated healthy horses with the blood of those suffering from this disease, but with negative result. He had himself injected into a dog 60 degrees cc. of blood from a patient with tetanus, also without result; while Schultz and Billroth had done virtually the same thing, yet always with negative result. This was now explained by the fact that all these experimenters used dogs, which are known to be refractory to the disease. It was then that Carle and Battone succeeded as mentioned above. They injected into twenty-one rabbits an emulsion made from the pus of an acne pustule, from which a fatal tetanus had developed, and they introduced into the sciatic nerve sheath. Eleven of these animals died of tetanus. They recognized the fact that the pus so injected was swarming with micro-organisms, but had no success with cultivation experiment. It was in 1886 that Rosenbach made his first inoculation experiments by introducing a small piece of skin from the neighborhood of a wound of a patient dying of tetanus underneath the skin of guinea pigs and saw tetanus develop in each animal within a few hours. Similar experiments with skin from a part at some distance from the poisonous wound had no result. It was evident, therefore, that inoculation succeeded only with material taken directly from the infected spot. He succeeded also in transmitting the disease from animal to animal. These experiments agreed with those of Nicolaier, who got his material from black earth. Socin, Pollon and Jeannel imitated him successfully, and Hochsinger and Bonome verified his experiments, as also did Shakespeare of Philadelphia. Lumnitzer has multiplied these experiments and made a precise study of the bacillus of which we shall speak very shortly in some detail.

It will be seen from the above statement why writers in the past have with reason spoken of the telluric origin of tetanus. Quite recently in Paris Verneuil has strongly defended what may be called the equine origin of tetanus, according to which the earth which causes such lesions and which contains the tetanogenic germs is especially that which has received the dejections of the horse. Tetanus is known to occur very frequently among grooms and those who care for these animals, and falls from a horse and horse kicks are frequently alleged causes of the disease. (Horse dung seems especially suspicious material.) It is least common of all among sailors, but when happening among them occurs almost exclusively on board ships used for the transportation of these animals. Numerous reported instances lend a certain degree of plausibility to these views, and they are entitled to at least respect, if not to complete credence. Within the past few weeks I have been called to attend a lad who was caring for a horse that had developed a typical case of tetanus, but recovered therefrom. Before the horse was well the boy ran through the sole of his boot a rusty nail which projected from the floor of the shed in which this horse was kept. In just one week he developed the symptoms of tetanus and died within forty-eight hours. Of course it would be folly to think that the horse generated the germ or the poison, but the coincidence is certainly striking. All the specially infectious bacteria have their favorite soil; those of typhoid and cholera are found most often in water; those of suppuration, about the skin and hair, and it is not difficult to admit at least that the germs of tetanus abound especially around the horse.

It is hardly necessary to detail the *minutiae* of Rosenbach's experiments. He found, as has every other observer, that the symptoms proceed in almost every instance from the point or part affected; that if it be in a limb that the poison was first introduced, this limb is first involved in

spasms, and that the so-called tetanus hydrophobicus could be produced when the inoculation was made about the head or face. Examining the material with which he inoculated, he found a mixture of numerous forms, staphylococci, streptococci, diplococci, large and small bacilli, with and without spores: As one among these many forms he recognized the bacillus described by Nicolaier, but his best endeavors to make a pure culture of the specific organism failed. He even discovered that it or its spores were not destroyed by a temperature of 100 degrees C. after five minutes' exposure, and although by thus heating he killed off all or nearly all of the other organisms, he was still unable to make a pure culture of the one he was after.

It has remained for Kitasato to isolate, to cultivate and to study the organism in all its biological and pathological relations, and while he is not the discoverer of the organism, we owe to him mainly what we now know about it. He first worked with the pus from a patient dying three days after the onset of a typical tetanus, as well as with fragments of the splinter which caused the injury. In this material he found three forms of obligate anaerobic bacteria, five facultative anaerobic forms and seven aerobic. The principal difficulty, of course, was to separate from these the particular organism which he wanted, and he succeeded by a method which those who desire to identify this organism will hereafter have to follow. He placed the mixture upon agar or blood serum and then kept this in the thermostat at 38 degrees C. for forty-eight hours, during which time the tetanus bacilli were stimulated into a free formation of spores. The culture tubes were then placed in a water bath which was kept at 30 degrees C. for from three-quarters of an hour to an hour. By this heat all the other organisms were destroyed and only the spores of the tetanus bacilli were left active. Inoculations of this into mice provoked the disease as typically as ever. He then planted these spores in gelatine and agar and cultivated them as anaerobes in an atmosphere of hydrogen at a temperature of 18 degrees to 20 degrees C. And so by fresh refinements of technique, which need hardly to be mentioned here, he established that the tetanus bacilli might be cultivated in pure form, and that they grew as obligate anaerobes with spore formation, their spores being extraordinarily resistant in the matter of temperature.

They are not necessarily killed by exposure to the air, but grow only when the atmosphere is excluded. Under hydrogen they grow luxuriantly; under carbonic dioxide, not at all. The agar or gelatine in which they are planted must be very slightly but positively alkaline. They fluidify the gelatine with very slight formation of gas. If to the gelatine or agar 2 per cent. of sugar be added, their growth is more rapid, and it is even more so if to the culture material 0.1 per cent. sulphindigotate of sodium be added. They can even be grown in alkaline bouillon if hydrogen be present; they then generate a peculiar odor as if something were burnt. They can be cultivated from one generation to another without losing their virulence and without necessity for frequently passing them through animals. They may be grown on plates under hydrogen, but are ordinarily cultivated along the needle streak, which very slowly, if at all, reaches the surface. They grow most rapidly at blood heat, very slowly at 20 degrees C., but below 14 degrees C. they do not grow at all. At blood temperature they form spores within thirty hours.

They have three principal phases of existence, viz., a spore stage, a bacillus stage and a spore-bearing stage.

As grown in gelatine at ordinary temperature they form separate bacilli, or gather in long threads. When they form spores at higher temperature the spores are round and met with at one end of each bacillus, so as to give it a peculiar hat-pin or drum-stick shape. It stains best during this shape. They possess a very slight motility, which is better demonstrated on the warm stage. Bacilli which contain spores apparently have no proper motion. They take the ordinary aniline colors well and may be stained by Gram's method. The spore formation can be demonstrated to advantage by Ziehl's method of double staining. The bacillus seems to multiply by fission as well as by spores.

It is most interesting and important to know that the spore bacilli when dried by the ordinary method and then kept for some days in an exsiccator over sulphuric acid, and then kept in ordinary atmosphere, preserve for months their virulence, and that their spores were found still acting by Kitasato after having

been mixed with earth that had been sterilized in a steam apparatus for ten hours. Evidently, then, tetanus spores are extremely resistant. Moist heat for an hour does not kill them, and, as Rosenbach had previously found, even five months' exposure to moist heat at 100 did not destroy them. Ten hours' exposure in 5 per cent. carbolic acid left them still virulent; only after fifteen hours could they be thus destroyed. So also it took three hours' exposure in a 1 per cent. sublimate solution, or thirty minutes in the same solution to which had been added 0.5 of 1 per cent. of hydrochloric acid. To other chemicals they are equally resistant.

Kitasato left standing for two days a bouillon culture which he shook up with 10 cc. of chloroform. After the chloroform had been removed he injected several animals with the culture and found it pathogenic as ever, while fresh culture grew luxuriantly. When subcutaneously inoculated, small animals develop tetanic symptoms within twenty-four hours and die usually in less than seventy-two. Pigeons appear somewhat liable to the disease. It is evidently quite unnecessary that any foreign body should be introduced along with the active germs, as would perhaps appear from a study of the well-known features of the disease. Ordinarily there is no local reaction at all, and on a section when a splinter has been used, one finds it imbedded in a mass of leucocytes without other disturbance.

It is to be emphasized that the symptoms of tetanus are almost invariably at first local, the muscles being first involved at that part where the inoculation was practiced. It is furthermore noteworthy that by the microscope these organisms are never found at any distance from the wound, and that, moreover, even here they perish within less than twenty-four hours, except as they may be found in the pus. Most careful examinations of the brain, the nerves, the muscles, the viscera and even the blood fail to reveal the slightest trace of them, and inoculations practiced with these tissues or fluids are almost always without results.

It is also of great interest that only tissues from the immediate neighborhood of such a splinter are infectious, and that inoculations with blood, brain, nerves or other organs of the animal have never caused the disease. Possibly in the above fact we may find an explanation of some of the cases above referred to, those of the disease supervening long after the healing of a wound, since the period of incubation in man is known to vary within wide limits.

Such a case has indeed been reported by Renvers from Leyden's clinic. Deep in the sole of the foot was found a splinter of wood an inch long. Inoculations with particles from this splinter succeeded, while those made with tissue only three millimeters distant from it produced no disease.

Kitasato trephined animals and then inoculated the dura with a pure culture, but after their death was unable to find the slightest trace of the bacilli in the brain tissues or in the blood; while culture experiments with the same all failed. These statements are somewhat at variance with those made by some earlier experimenters, yet they appear to bear the stamp of certainty, and have been corroborated by many other investigators. In order to demonstrate their action still further Kitasato practiced inoculations as before, which were followed within half an hour to four hours by excision of the inoculated area and cauterization of the wound thus made with the actual cautery. The animals died just as if nothing had interfered with the virulence of the disease.

Repeating the experiments several times I have myself obtained the same results. Although it has seemed to me as if the onset of the symptoms were somewhat postponed and the progress of the disease somewhat delayed. The rapidity with which all bacilli vanish from all the tissues and juices of the body is perhaps the most astonishing feature of the disease. Presumably they generate a poison whose effects are far-reaching, and this poison has been studied by Kitasato

and Weyl, who have very recently published a further communication upon the subject. The conclusions arrived at by Kitasato are briefly as follows:

1. Tetanus is a specific disease.
2. The active agent in producing it is a bacillus which is identical with that described by Nicolaier and later studied by Rosenbach, and now determined to be an anærobic organism.
3. The bacillus is found in the pus from tetanic patients and animals. It often forms spores in such pus, nevertheless may be frequently met with while free from spores.
4. It is possible to cultivate this bacillus from such pus, and with pure cultures of it to reproduce tetanus in animals.
5. The somewhat contradictory statements of early observers find their explanation in the fact that tetanus is met with in various stages, and that the more quickly the animals die from the disease the more likely are we to find spores in the bacilli. But these bacilli are, or have been, always present, and from them one can always cultivate spore-bearing descendants.

A consideration of the specific factors involved in tetanus is inseparable from that of the toxins or ptomaines which they produce. During the period intervening between the time of inoculation and the first symptoms of the disease, there probably occurs a gradual increase in the numbers of the micro-organisms, while there is slowly elaborated an increasing amount of those toxic substances. These are at first eliminated probably by the skin and kidneys as rapidly as formed, but they finally accumulate sufficiently to display their activities, first upon the nervous system and later by the usual symptoms and signs of the disease as well known. It is corroborative of such view that the administration of full doses of pilocarpine in the early treatment of the disease is followed by benefit. The common treatment of the disease as well denotes the same, since the chloral so often given tends to lessen the recognition of afferent impulses and the bromides to decrease the force of the motor explosion following. (*Medical News*.)

Since Kitasato published his first formal paper in the *Zeitschrift f. Hygiene*, he and Weyl have made three communications upon the ptomaines or poisons by which the bacilli produce the symptoms of tetanus. As is well known, Brieger isolated from cultures of tetanus bacilli a crystalline material which he named tetanin. Working with the hydrochlorate of this alkaloid, the above observers demonstrated that it produces in mice spasmodic disturbances and increased flow of saliva.

Another analogous substance separated from cultures in the same way has been called by Brieger tetanotoxin. Their experiments with this material produced results which were also analogous, and yet it appears from their work that the dose of either of these alkaloids must be relatively so great that one is forced to the conclusion that the tetanus bacillus in the living organism produces a poison of much greater virulence than either of these yet isolated. They promise further studies and the publication of their results.

The investigations of Dr. Shakespeare of Philadelphia also deserve mention here. He was able by placing in contact with the central nervous system of healthy rabbits infusions of the spinal cords of tetanic cases, to speedily produce characteristic symptoms of the disease, while the subcutaneous injection of the same material had no effect. Although during his experiments he failed to discover specific micro-organisms, he nevertheless showed what has been demonstrated in another way by others, that the exclusion of the tetanogenic spores by extirpation of the infected sore, or by amputation of the limb in which it occurs, with distinct failure to arrest the disease, confirm the idea of local activity, combined with the elaboration of poisonous matters circulating in the blood. (*Medical News*, Oct. 25, 1890.)

Among very recent experiments concerning tetanus are those of Babes and Puscariu. (*Centrablt. f. Bakteriöl*, VIII., No. 3.)

They worked with cultures received from Kitasato as well as with those which they isolated from horses suffering from the disease. From those animals which died as a result of inoculations only the bacillus from the point of inoculation could be cultivated, but nothing from the veins or internal organs, nor from the brain or spinal cord. Nevertheless, mice and rabbits which received small doses of these fluids died from some poisoning without tetanic symptoms.

For purposes of experiment, two mice and two rabbits were inoculated with emulsion of brain tissue from a rabbit dying with tetanus. The former died in four days, the latter in eight, without symptoms of tetanus. In the endeavor to discover or invent a protective injection, these experiments were repeated and the emulsions were made with bouillon in different strengths, but the animals nearly all died.

Babes prepared an albumose out of agar cultures which did not contain peptone, whose watery solution was passed several times through a Chamberland filter. This substance sometimes, but not always, produced tetanic symptoms with cramps and paralysis, and fatal results after varying lengths of time.

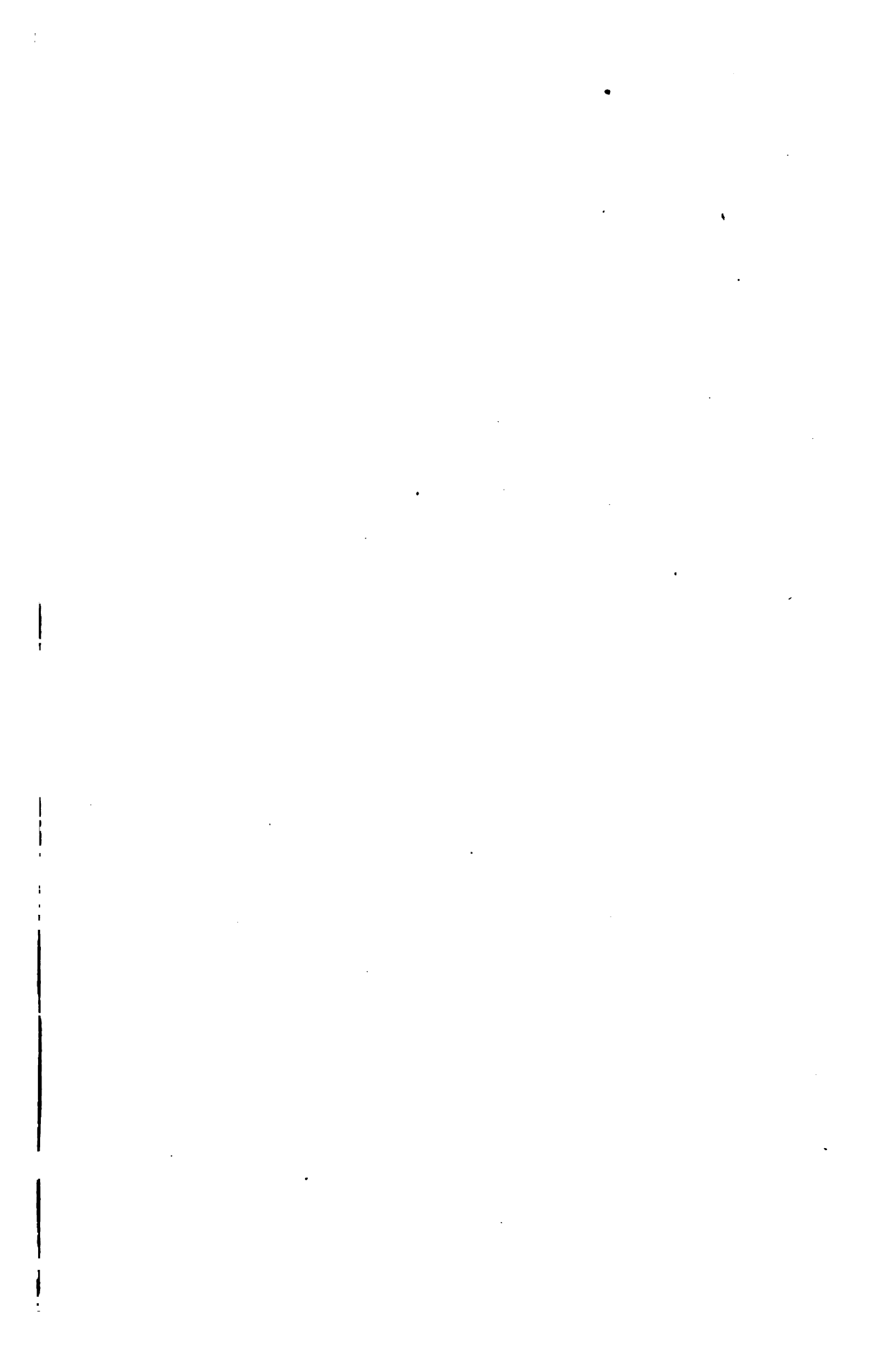
Tizzoni, Cattani and Baquis have investigated three cases of tetanus, from which they isolated five different forms of bacteria, of which two only were pathogenic. The first of these seems to be identical with that described by Kitasato. The second was recovered from the blood and spleen of an animal dying after subcutaneous injection of specific pus.

It was also a bacillus smaller than the other, having involution forms and producing spores. It also showed itself to be anaerobic. After subcutaneous injection, typical tetanus was produced in most of the smaller animals. These authors were not able to deny, however, that this organism might not be identical with Kitasato's. They claim that both of these bacilli lose somewhat of their virulent power with time and peculiarity of culture medium. They, like Kitasato, found no protection from excising the point of inoculation. (*Zeitler's Beiträge*, vii, 4.)

A recognition of the minute causes of tetanus raises the question as to what can be done for the disease. Evidently the bacilli themselves remain at the point where first introduced, while the poison which they produce circulates. Numerous observations seem to prove that this poison can be antidoted by reasonably strong solutions of various antiseptics; 5 per cent. carbolic solution, or 1 per cent. of nitrate of silver, or bichloride of mercury destroy the germs in the culture tubes; so also does exposure to steam for five minutes. The German writers seem to have confidence in iodoform when packed into the wound. The anaerobic organisms, to which these bacilli belong, have a powerful reducing action, and are therefore capable of splitting up iodoform and of producing iodine in pure or nascent condition. In experiments upon animals, 10 per cent. solutions of iodoform in ether applied to the point of inoculation within an hour afterward have sufficed to prevent the development of the disease, but all experiments go to prove that whatever is done must be done within a very short time after the inoculation. The uselessness of amputation in well marked cases is very plain from the above experiments, as well as of any other destructive or mutilating operation. The method by incision recommended by Bilguer, by which air was freely admitted to the tissues, has in it something to recommend itself. Of course the very earliest possible removal of the foreign body should be effected. Military experiences show that recovery has sometimes followed the removal of the irritating substance. Isolation, nutrition and stimulation, with such drugs as may control symptoms, sum up the internal treatment of these cases.

Bibliography of Recent Papers on Tetanus.

- CARLE AND RATTONE.—*Giorno dell R. Acad. de Med. di Torino*. 1884.
 NICOLAÏER.—*Beiträge zur Ätiologie des Wundstankrampfs*. Inaug. Dissert. Göttingen. 1885.
 Also *Deutsche med. Wochenschrift.*, 1884, S. 842, No. 52.
 ROSENBAUGH.—*Archiv. f. klin. Chir.*, 1886, Bd. 34, S. 306.
 KITASATO.—*Ueber den Tetanusbacillus*. *Zeitschrift. f. Hygiene*, 1889, vii, S. 225. Also *Verhandl. d. Deutsch. Gesellschaft. f. Chir.*, 1889, p. 101.





VICE-PRESIDENT SAMUEL C. BENEDICT, M D., ATHENS, GA.

- KITASATO UND WEYL.—Zur Kenntniss der Anaëroben. Ibid, 1890, viii, S. 404.
- RENVERS.—Zur Ätiologie des Wundstankrampfs. Deutsche med. Woch., 1890, No. 32, S. 719.
- BABES UND PUSCARIU.—Centralbl. f. Bakteriöl., viii, No. 3.
- TIZZONI, CATTONI UND BAQUIS.—Bakteriologische Untersuchungen über den Tetanus Beiträge zur Path. Anat., vii, 567.
- KITT.—Ueber tetanus Impfungen bei Hausthieren. Centralbl. f. Bakteriöl., 1890, vii, No. 10.
- RICOCHON.—Etude clinique sur l'etiologie du tetanos. Gaz. Hebdom., 1888, xxxv, Nos. 35 and 36.
- VALLAS.—Nature infectieuse du tetanos. La Province Méd., 1889, No. 1.
- CHANTEMESSE ET VIDAL.—L'etiologie du tetanos. Bullet. Méd., 1889, No. 74.
- MALJEAN ET PEUGIEZ.—Recherches sur la nature et le mode de transmission du tetanos. Gaz. Hebdom., 1889, xxxvi, No. 44.
- VERNEUIL.—Origine et pathognéie du tetanus. Rev. de Chirurgie, 1887, p. 759.
- BEFANTI AND PESCAROLO.—Centralbl. f. Bakteriöl., v, 711.
- BOSSANO.—Attenuation du virus tetanique par le passage sur le cobaye. Comptes rendus, 1888, p. 1,172.
- LOCKWOOD.—Report on Aseptic and Septic Surgical Cases. Br. Med. Jour., 1890, Oct. 25, p. 945.
- BRIEGER.—Zur Kenntniss der Ätiologie nes Wundstarrkrampfes. Deutsche med. Wochschft., 1887, No. 15, S. 303.
- SANCHEZ-TOLEDO ET VEILLON.—Recherches microbiol. et exp. sur le tetanos. Archives de med. experim., 1890, ii, 709.
- Vide also:
- FRAENKEL UND PFRIFFER.—Atlas d. Bakterienkunde. Lfg. vi. Tafel xxvii, et seq.
- PEYROUD.—Etiologie du tetanos. La Semaine Méd., 1890, No. 44.
- CAPTAN.—Du bacille du tetanos. Ibid, No. 46.
- SANCHEZ-TOLEDO ET VEILLON.—Presence du bacille du tetanos dans les excrements du cheval, etc. Ibid, No. 45.
- PLA.—Naturaleza infecciosa del tetanos. Cronica médico-quirurgica de la Habana, April 1890.

Dr. E. R. Lewis moved that a vote of thanks be extended to the doctor for his able contribution. Carried.

Dr. O. P. Barber of Saginaw, Mich., then read a paper on "Burns and Scalds."

BURNS AND SCALDS.

I wish to lay before you in a brief manner a little personal experience I have lately had in the treatment of severe burns and scalds. Without going into detailed *minutiae* regarding the different degrees of either and eliminating all the wordy paraphrases that every text book furnishes, I would like to call your attention for a few minutes to what I have found as faulty in the way of dressing in these cases.

When called to burns or scalds (if at all severe) we find the patient in mortal agony and suffering from shock, the household upset, everybody tumbling over each other, nothing to do with and everything and everybody in chaos and confusion. Somebody has rushed in with the molasses jug, the flour barrel has been raided, someone else, with great presence of mind, produces a drachm or two of vaseline down in the corner of a bottle, and the fearful, inevitable curse of this and subsequent dressings—a roll of cotton batting.

The doctor arrives on the scene, having been delayed on the way by a halt at the druggist's long enough to concoct that filthy, time-worn, microbe-worried "chestnut," carrion oil and lime water. This is poured over the destroyed surface or cloths saturated in it laid on and the inevitable batting (and a "roller" to retain it over all) and everybody seems satisfied—except the patient.

Now, then, if perchance any of you may have seen a burned surface dressed in this manner, will you not agree with me that the next dressing is one that compares favorably with the horrors of the Inquisition? Everything adherent, agglut-

inated, topsy-turvey—the carrion-oiled cloth dry, stiff and harsh and irritating; the cotton batting has worked its way by contortions and writhings of the body down into the raw secreting surfaces and becomes a potent irritant requiring untold time and patience for its removal. Is this sketch overdrawn? Not a word of it. Then, again, the more modern aseptic surgeon may have been called, and expends time, care and ablutions with carbolated solutions to cleanse, dresses with expensive Iodoform, gauzes over extensive surfaces, covers with cotton and the bandage and calls the next morning to find everything upset; his expensive gauzes have slipped away. King Cotton again is triumphant and a redressing then and there tedious and inevitable. Do I not again speak by the card when I allege that this too is unsatisfactory and expensive?

To go further, the deeper burns commence to slough. Something must be done; dressings to be cleanly must be more frequent. What are they? Poultices are out of date; they have no place in modern surgery; but still the rotten, necrosed tissue is there and must be rid of, and frequent irrigation cleansings with antiseptic, etc., are in order (but you cannot leave it uncovered and naked). Gauzes are expensive, the burns extensive, and the question is a vexed one; patience wears out and so does the patient.

To go further still, the necrosed tissue has sloughed, everything is clean, the deeper wounds commence to granulate—aye, there's the rub—they do too much granulating; if the raw surface is at all dependent or hanging they rapidly become profuse and prominent and elevated and bleed so freely and easily that in large, deep burns they exhaust the patient and are hard to keep within bounds.

This, gentlemen, in short has been my experience in burns and their treatment as commonly laid down and carried out in most articles that I have read, and has been very unsatisfactory.

A recent experience with some severe burns has emphasized all of the foregoing statements as only too true and caused the consequent development of an idea which originated this paper.

A year ago while attending Prof. McBurney's clinic at the Roosevelt Hospital I saw the most courteous gentleman and elegant operator do some extensive skin grafting after Thiersch's method, and in the details of dressings he covered his grafts carefully with rubber tissue to protect and nurture them. Later in an able descriptive article in the "Medical Record" he wrote of this method and related cases and spoke particularly of the intense pain caused, not from the grafted surface, but the surface from which the graft was shaved, stating that from a suggestion from one of his assistants this also had been rendered painless by covering with rubber tissue. If a shaved raw surface could be rendered painless by covering with rubber tissue why not a burned raw surface? was the refrain and burden of the song that ran in my mind, and having a fresh case on hand I tried it. The result has been more than a surprise.

Since then I have used it on several burns and scalds from first to last. From first to last it entirely relieves pain. A grand result. It never sticks, pulls or adheres. It is quickly applied—it is instantaneously removed. Thoroughly washed in carbolated solution it is rapidly reapplied. It is the poultice *par excellence* for removing sloughs. It protects the young granulations. It is the hothouse that propagates them—holds them in place—they cannot elevate or become fungous; they must attend strictly to business because they are held down to it and they spread out in the right direction. It is cheap. Forty cents a square yard. Washed in a tepid carbolated solution it is aseptic. Reapplied after cleansing again and again it is both cheap and aseptic.

Railroad surgery has much to do with burns and scalds, and the dressing which instantaneously relieves pain, is quickly applied and easily reapplied without sticking or pulling is a desideratum. The first dressing often occurring in localities and situations not the most convenient is a Godsend to any surgeon.

My method of applying it is as follows: Take for instance a burn or scald of the legs below the knees. After stripping the patient and washing freely the burned surface by pouring over it warm carbolated solutions and removing all destroyed tissue, punctured blebs, etc., I wrap tightly and snugly around it a strip of the rubber tissues large enough to reach from knee to foot and completely encircling the limb. This tissue has already been soaking in carbolated solution while the wound was being prepared. The tighter and more snugly the tissue is applied of course the more it excludes air and quicker relieves pain. Over this absorbent cotton and a roller give a complete and satisfactory dressing.

I desire, therefore, to call your earnest attention to this article of rubber tissue in the treatment of burns and scalds. If it gives you the satisfaction it has me in such cases, which I know it will, you will provide a permanent place for it in your emergency cases.

Dr. H. B. Tanner followed with a paper entitled "Car Couplers," by Dr. J. F. Pritchard of Manitowoc, Wis. (in the absence of the author). The paper was discussed by Dr. Stemen.

CAR COUPLERS.

At the last meeting of this association a resolution was adopted aiming to bring about the use of automatic couplers for cars. I think that we are overstepping our bounds when we attempt interference in this matter and believe, with the managers of railways, that we had better attend to our surgery and leave these questions to those more competent to judge of them. However, during the past year, in order to present to this society the exact situation as nearly as possible of this question, I have undertaken an investigation of the subject, as to what percentage of accidents on railways are due to the link and pin coupling and the status of automatic couplers on cars, and in June, 1890, sent out to nearly every important railway in this country and Canada a circular letter asking for information and replies to the following questions:

- 1st. What proportion of all accidents on your road are due to the link and pin coupler?
- 2d. What percentage of these are unavoidable?
- 3d. What proportion are due to automatic couplers?
- 4th. What automatic coupler do you prefer? 1st, for freight cars? 2d, for passenger cars?

While the questions asked covered a good deal of ground and involved, I am aware, a great amount of investigation, yet very few railway managers have failed to reply.

In addition to the replies from the managers of railways I have gleaned a great amount of information from state reports of railway commissioners, covering a number of the larger states, as well as the reports of the Inter-State Commerce Commission, the Bureau of Labor Statistics, and in fact from every source which would afford comparison, and the general results of which might be presented in order to show the percentage of accidents due to link and pin coupling, and also to compare this form of accident with others on railways, and in addition to show what relative danger there may be to railway brakeman, as compared to other

classes of men employed with machinery, and to give as carefully as possible a view of the situation regarding automatic couplers.

You will remember that in the investigation the question of automatic couplers has been pretty thoroughly sifted, and we find that all important roads have the question under consideration, and, without regard to legislation, are testing the practicability of various kinds of automatic couplers, to find many, very many, much more dangerous than the simple link and pin. It is not at present possible to adopt any one coupler, and, if so, the period of transition must be very dangerous, for all admit that it is much more difficult to couple an ordinary link and pin with an automatic coupler and utterly impossible to couple some so-called automatic couplers with others of a different type. Another fact which has nothing whatever to do with the kind of coupler is the construction of cars, viz., different heights of drawbars and car bodies, position and form of deadwoods and whether the coupling is to be used in connection with air brakes or not. In fact, there are so many factors in the problem, in addition to the form of coupling, that it must take a long time to settle it, and legislation is likely to hinder rather than help it. In states where there has been legislation requiring railway companies to adopt automatic couplers, roads, to my personal knowledge, have adopted a succession of them, only to find the danger increased, and, as a matter of self-protection, were obliged to experiment until the question resolved itself back to first principles. But in order to comply with the law and have a coupler that can be coupled with any other device in common use on all other roads, is practically settled, and most roads have now adopted the master car builders' type, which admits of coupling with the link and pin and with others of the same class, but these are far from perfection, as will be shown further on. Of these there are a number, all having the general type of a horizontal hook and knuckle, which is rather expensive to adopt and troublesome to keep in repair, but better than anything else yet devised, still far from perfect.

While on this subject of types of automatic couplers and the difficulties attending changes, I will quote from the reports of the Inter-State Commerce Commission and many state reports, not only as to types, but other facts which have come to their notice. The Inter-State Commerce Commission says:

It is a mistake, however, to imagine that these difficulties are easily remedied or that there have been until recently automatic devices against which serious or fatal objections could not be brought, although some thousands of couplers have been patented. The difficulty has been not to choose among good ones, but to find any good one. Nor can any mechanic, however great his experience, judge, by looking at a coupling device or by merely mechanical tests, what defects it may have. The conditions are so complex that only various and extended trial in actual service will determine the merits of a coupler, and many which gave the greatest promise have failed in such a trial. Nor is it possible, consistent with public safety or with railroad interest, to neglect the non-mechanical consideration, most difficult of all to satisfy, viz., that automatic couplers to be successful must be of uniform type throughout the country.

"It is not at all necessary that they be of the same patent, but they must couple automatically with one another" (and I may add that during the transition period they must couple with the link and pin and other devices now in use). "That this uniformity is essential follows directly from the fact that freight trains are made up of a mixture of cars from many railroads and that it is more dangerous to couple two automatic couplers of distinct types than to couple with the link and pin; in fact, it is the difficulty of obtaining this uniformity that now offers the most serious objection to the progress of automatic couplers."

I would add to this that Congress cannot reach this question because they cannot interfere further than in Inter-State traffic, and there seems to be no proper

understanding of the difficulties of the situation by most state legislators. They are ready usually for any hostile legislation regardless of its impossibilities or dangers, neither can they specify couplers, at least they can only mention types, which leaves the question still an open one and what is usually worse, if railways are compelled to comply with such legislation it increases the danger very materially.

The Board of Railroad Commissioners of the state of New York says:

As pointed out by the board in previous reports, great difficulty has been expressed by the railroads in determining upon an automatic car coupler. Much confusion has resulted from different roads adopting different devices. Some progress has been made but not as rapid as it would appear desirable. Certainly the record of accidents from this cause as yet shows no diminution. The law is clear and positive upon the subject and the board is not aware of any violation of it. The great difficulty in the matter is, that of the total number of cars operated at any one time in the state a large proportion is the property of corporations without the state and not, therefore, within the provisions of the law.

To attain the main object of an automatic coupler it is most desirable that but one device should be in universal use. If there be a diversity it will increase rather than diminish the present danger. From the diversity of the recommendations made by the states which have already acted on the coupler question, it seems to be hopeless to secure uniformity from their acting separately. There appear to be but two ways for this to be brought about, one by the operation of the "survival of the fittest," the other by the creation by Congress of a commission to determine upon one coupler and compel its adoption by all companies engaged in an inter-state commerce.

But would this solve the problem? How many roads are not doing an inter-state business, and while they may have foreign cars on their lines, properly equipped according to the above recommendation, yet their own, under state laws may have an entirely different equipment.

The Railroad Commission of Kansas says:

The present condition of automatic couplers is that of experimentation purely. Railway managers manifest a desire to test any and every new device for the protection of employees from need, less danger and themselves from the cost and loss incident to accidents. In this connection the "Standard Coupler" holds the same relation as other devices being tried, except that this one has secured the approval of the Master Car Builders' Association. It is not accepted as a maximum result of genius and mechanical skill directed to this subject. That it is wise or safe to settle down to a conclusion that it is the best thing that can be made and to adopt it in universal practice at an enormous cost, when it may soon be improved upon and have to be abandoned, is not the judgment of managers nor trusted experts.

Railroad Commission of Maine:

The action of the Master Car Builders' Association in adopting, not a coupler, but a type of coupler, we believe has tended to hinder more than to promote the general adoption and use of automatic couplers.

Railroad Commission of Massachusetts:

Our railway companies are not enthusiastic over the master car builders' standard type. The automatic couplers which have been approved by the board are the Janney, the Hillard, the Cowell, the United States, the Hein, the Boston Automatic and the Safford. Most of these were approved before the Master Car Builders' Association made its selection. The progress toward a uniform automatic coupler is not satisfactory and in the opinion of this board can only be secured by Congressional interference.

We may ask why this board, having the opportunity to secure and recommend a uniform type, has not done so, and we would also like to know, with the above list of so-called automatic couplers, how much it has decreased the dangers of coupling?

Railroad Commission of Michigan:

There has been no apparent improvement in the use of automatic couplers in any general sense. The commission has approved of seven different couplers for use in this state, as required to do by the provisions of the statute there recently passed by the legislature regulating such use. But it is nevertheless true that not one of the couplers there selected has come into general use in the state or has proved a success in any practical sense. The couplers were put upon cars th

went into general use, and the almost universal practice of trainmen has been to couple the automatic coupler by the ordinary way of going between the cars and guiding the link with the hand. The trainmen generally are opposed to any form of the automatic coupler and express a preference for the Safford link and pin coupler. In short, so far as the situation in Michigan indicates, very little progress has been made in the adoption of automatic couplers, except to demonstrate how great are the difficulties to be overcome before they can be expected to come into general use.

While on the subject I will quote you a few opinions from the railway side of the question, for surely they are entitled to be heard.

Theo. N. Ely, formerly general superintendent of motive power of the Pennsylvania Company, says:

Improvements of greater or less magnitude are constantly being made in equipment for the purpose of making travel on both freight and passenger trains safe, but there are none that need be especially mentioned. I am clearly of the opinion that Federal legislation of these matters would not be desirable, but do think if the Inter-State Commission would from time to time make suggestions for improvements, the moral effect would be good and that it would tend to keep alive the spirit of progress. Whenever state legislation has been had upon the mechanical appliances of railroads the result has, as a rule, been disastrous, arising from the fact that no commission or board of experts that it would be possible to organize could decide definitely as to the relative merits of the devices which might be presented and as to whether a chosen one would practically meet the purpose for which it was intended. I think I am seconded in this statement by every officer in the land that has had charge of the development of the railroad practice. The extreme difficulty of making decisions when radical departments are involved can be appreciated only by men who have devoted their lives to work of this, or an analogous kind.

M. N. Forney, a noted writer and expert in railway mechanism, says:

There are some precautions for the safety of railroad employes, such as a maximum and minimum height for drawbars, a standard form of wheel, the form, proportion and height of deadblocks, and a minimum clear span between cars when deadblocks are in contact, which certainly should be generally adopted; but a distinct recommendation would mean more or less legal responsibility for injuries to employes; would, for the present at least, be authority enough. To compel all the railroad companies of the country to adopt some system of steam heating for cars, continuous freight car brakes, automatic couplers and improved signals, would involve the expenditure of many millions of dollars and would bankrupt some of the weaker lines. The consequence would be, if it had the power to compel the adoption of such appliances, that pressure would be constantly brought to bear on the commissioners to recommend only such as the poorer roads could afford to put on.

A system of inspection which would take cognizance of over a million of cars and some twenty-eight thousand locomotives is a colossal undertaking and in the shadow of some scandals which are whispered and spoken with more or less distinctness concerning steamboat inspection service it would seem to be a dangerous undertaking.

These opinions may be multiplied, not only from various state commissions but also from unbiased railway authorities.

The second part of the paper relates to the relative percentage of accidents to brakemen as compared with other men in railway employ, and in accidents to this class of men, eliminate those due to coupling alone, and in these an attempt has been made to classify unavoidable accidents due to coupling. This would, if successful, reach the question at issue, but I find that on all roads where men are cared for by railways or benevolent railway societies but little account is taken whether the accident was due to the man's own carelessness or whether it was due to some fault of the coupling attachment. I know of no case in which any man is asked to assume any risk whatever. Many of these accidents occur from mere bravado. The stick required to guide the link is not used once in a month, and, in my opinion, after weighing the subject carefully and comparing with other classes of men employed with machinery, that there will be but little difference in the number of injuries, no matter what device may be used. And railway managers could better deal with the many complicated questions that are constantly arising in the work if they could always be sure not to have the best of appliances

ruined or reported adversely upon, because some of the men employed could not be depended upon to care for it or were adverse to operating it from mere lack of interest in the work. I have not mentioned other causes for injuries because I have now taken up so much time, but from the foregoing they will occur to you. And in conclusion, if I have made this question somewhat clearer to you, so that it will not again appear in our society, where it certainly does not belong, I shall feel amply repaid. We do not care to follow the example of pothouse politicians. Because we happen to assemble in convention we must pass resolutions. Let us devote the labors of this society to railway surgery.

On motion of Dr. Lewis the committee appointed to draft appropriate resolutions regarding the Flower bill was granted further time to make its report on account of the absence of the chairman (Dr. Murdoch), the report to be made at the next annual meeting.

Dr. Herman Mynter of Buffalo read a paper entitled "A Case of Crushed Kidney Caused by a Railway Accident."

A CASE OF RUPTURED KIDNEY FROM A RAILROAD ACCIDENT, WITH REMARKS.

The following case is of peculiar interest, as the injury is one very frequently produced by railroads and very fatal in its consequences.

On Jan. 27, 1891, I was called to Oil City, Pa., by a dispatch, stating that a man had been severely injured by a railroad accident, and that probably a laparotomy would have to be performed. On arriving, late in the evening, I saw the patient, Mr. A. Wood, aged twenty-two, and learned from his attending surgeons the following history:

Late in the evening on Jan. 23, four days previously, he was caught obliquely between the bumpers while coupling cars. He stated then that he was not seriously hurt and could continue work as brakeman on a freight train. He actually did ride thirty miles on the train, but then had to give up on account of faintness, pain and vomiting, and was brought back to Oil City, where Dr. Coulter was called to see him on Jan. 24 at 3:30 A. M. He found no visible injury, no fracture of pelvic bones, no particular tenderness in abdomen, except in right iliac region, where he had considerable pain by pressure. No ecchymoses were present anywhere. At this time he was not considered seriously hurt. During the day (Jan. 24) the patient could not urinate and was in great distress on that account. He managed at last to empty his bladder and the water contained a great amount of blood. After that his bladder was emptied with a catheter three or four times a day and the urine continued to contain more or less blood.

On Jan. 24 the temperature began to rise, being 102.5 degrees, but afterward gradually receded to 100.5 degrees. The pulse ranged from 100 to 108. On the same day tympanitis commenced, although not excessive. Some flatus were passed on Jan. 29. No hiccup. On examination the patient was seen to be a strong, healthy young man. Temperature, 102 degrees; pulse, 108, full and regular.

Considerable meteorismus was present, with tenderness in right iliac region. No particular tenderness in left side of the abdomen. The meteorismus prevented a careful examination of the abdomen. Over the right lumbar region a diffuse ecchymosis and some fullness and muscular rigidity were seen, and he was very tender upon deep pressure here. There was slight ecchymosis around anus and in perineum.

The urine was normal in quantity, but intimately mixed with blood, and of a

dark, dirty color. It contained no coagula of blood. His bowels had not moved, he having been kept under the influence of opium since the injury.

The question of diagnosis was first discussed. It was evident that the man was seriously hurt, but I thought we could exclude any injury to organs in the abdominal cavity. A crush or rupture of the bowels would probably have terminated fatally before that time by diffuse peritonitis, of which there were no signs. True enough, he had considerable meteorismus, but not more than could be accounted for by a slight traumatic peritonitis and the continued opium treatment. The normal quantity of urine, of course, excluded rupture of the bladder, not to mention the absence of diffuse peritonitis. A rupture of spleen or liver would probably have terminated fatally by internal hemorrhage in a short time.

The ecchymosis over the right lumbar region, on the other hand, the deep-seated pain and swelling here, the muscular rigidity, the intimate mixture of urine with blood, the fact that he vomited immediately after the accident, but otherwise was able to travel thirty miles and then first became faint and had to give up work, and lastly the tenesmus of the bladder pointed directly to the right kidney as the seat of lesion, and I thought I was justified in diagnosing a rupture of this organ.

The next question, whether he could be removed to Buffalo, as his family insisted upon, was settled with the diagnosis, and Dr. Coulter and I left the same night with the patient on a special train, and arrived at Buffalo at 6 o'clock on the morning of Jan. 28, the patient having stood the journey well. I had him transferred to the Emergency Hospital, and gave the order to have him take 3j of epsom salt immediately, and 3as every hour afterward till copious evacuations occurred, and to have him transferred to the Sisters' Hospital for operation at 11 o'clock. On his arrival there he had had several copious evacuations, with the result that the meteorismus had disappeared. An indistinct deep swelling, with intense tenderness by pressure, could now be felt in the right iliac region. Under ether narcosis exploratory incision of the right kidney was made in the usual way by an incision four inches long and two and one-half inches from the spine, extending from twelfth rib downward toward posterior superior crest of the ilium. Having reached the lumbar fascia, the usual yellowish white color was seen changed to an intense dark color from infiltration of blood. On passing through this fascia a large cavity was opened, containing about a pint of dark bloody fluid and coagula. The lower half of the kidney was found crushed to a pulp, and felt very much like an epithelioma of the uterus in the process of disintegration.

The question of nephrectomy was now in order, but bleeding from the crushed kidney was so copious by the slightest touch or manipulation, that all I could do was quickly to remove the blood coagula, disinfect the cavity with corrosive sublimate, and then pack it firmly with iodoform gauze, over which an antiseptic dressing was applied. One or two results were possible. Either the crushed parts might become eliminated by and by, and under favorable circumstances recovery might take place, or else, the bleeding having stopped and inflammatory thickening and adhesion having occurred, a nephrectomy might, later, be performed.

On Feb. 3 urine was noticed to pass through the wound. The dressing was changed without bleeding, and a new one applied. On the same day the water commenced to clear up, although still containing considerable pus. He gradually improved, the large cavity contracted more and more, the urine became more and more normal, the crushed parts of the kidney came away by irrigation, and on March 16 he left the hospital with the wound healed, with the exception of



TREASURER R. HARVEY REED, M. D., MANSFIELD, OHIO.

a small fistula, through which scarcely anything was discharged. The fistula has since healed completely, and the patient is in excellent health.

I desire to add a few general remarks on the subject of crushed kidneys. In regard to the etiology of ruptured and crushed kidneys, blows, falls and crushes are mentioned as the most frequent causes, not considering the cases which are produced by gun-shot wounds, etc. A quite frequent cause, probably the most frequent, are crushes between the bumpers of railroad cars. In "International Encyclopædia of Surgery" two cases are mentioned. One was that of a man, aged twenty-one, who was struck by the bumper of an engine. He vomited and complained of great pain beneath the ribs. Next day bloody urine was noted, which gradually increased, so that great tenesmus of the bladder occurred from coagula in the bladder. A dull swelling formed in the left side of the abdomen, tympanitis and delirium supervened and death occurred on the twenty-sixth day. The left kidney was found ruptured across the middle and the lower segment crossed transversely by numerous fissures. A large cavity was found surrounding the broken kidney, filled with grumous, offensive blood, clots and urine. In the peritoneum, forming the anterior wall of this cavity, there was a ragged rent in a thin slough, through which offensive serum was found to exude into the peritoneal sac.

The other case died on the eleventh day, a tumor having been observed on the left side, with similar symptoms as in the previous case. The left kidney was found completely divided through the pelvis and the two halves widely separated by blood and urine, which reached behind the peritoneum as high up as the diaphragm and as low down as the insertion of the psoas muscle on the femur. A kidney may become completely torn through, either transversely or longitudinally, there may be several small surface tears, or it may be pulped, as in my case.

The first and principal danger is the bleeding, which gradually may reach such proportions that strangling of the peritoneum from pressure occurs. If a large branch of the renal artery is torn death may occur quickly. If the patient survives this danger he stands an excellent chance of succumbing to a perinephritic abscess. Can you imagine a better chance for the development of a genuine abscess than a crushed kidney with a collection of blood and urine in the loose, fatty and easily destroyed tissue in the retroperitoneal space?

It is true that there are a number of recoveries from ruptured kidneys on record, the principal symptoms of which were hematuria, but, to say the least, it is questionable whether they were cases of ruptured kidney! Hematuria is not necessarily a symptom of ruptured kidney, occurring, as it does, from contusions, renal calculus, acute nephritis, etc.

On the other hand, a ruptured kidney may exist without hematuria if the ureter becomes plugged by a clot or completely torn across, so that neither blood nor urine can reach the bladder. In regard to symptoms I can give no better description than that of Henry Morris, surgeon to the Middlesex Hospital in London:

If after the abdomen has been run over or the person has fallen or been struck on the abdomen or loin, faintness, coldness, vomiting and abdominal pains follow; if on the day of, or the day after the accident, and whether the catheter be required or not, the urine is found to contain a quantity of blood and blood clot, and if after several days blood clots continue to pass, or pus as well as blood is voided in the urine; if, moreover, there is pain along the course of the ureter, with retraction of the testis, or a rigid and prominent state of some of the muscles on one side of the abdomen, with frequent desire to micturate; or finally, if a tumor, dull on percussion, forms in the loin, or lumbar or hypochondriac region of the abdomen, accompanied or not with signs of local peritonitis—there are safe grounds for believing that either the kidney or its pelvis has been ruptured.

The prognosis, at best, is doubtful and the mortality great. Dr. Otis gives statistics of 27 cases, of which 16 died; a mortality of 59 per cent. Maas gives another table of 71 cases, of which 34 died; a mortality of 48 per cent. Both added together give 98 cases with 50 deaths; a mortality of 51 per cent., all for subparietal injuries.

In compound injuries, by gun-shot wounds or penetrating instruments, the mortality is still greater. In the "Medical and Surgical History of the War" seventy-eight such cases are mentioned, fifty-two of which died; a mortality of 67 per cent. In none of these were operations performed.

When we, lastly, consider the treatment, then I believe that very little reliance can be placed in the usual administration of opium, ergot, astringents and cold applications, except in the lightest cases, which would probably recover without treatment. Considering that an exploratory incision of the kidney region under antiseptic precautions is an operation absolutely devoid of danger and that by no other means are we able to satisfy ourselves of the amount of injury done or prevent dangerous and fatal complications from occurring, I am strongly in favor, with Simon, of employing this method as a preliminary step in all cases in which there are serious symptoms of ruptured kidney. If we should find the diagnosis wrong or the injury less than we suspected, no harm will have been done. If right, we are in a position to judge about the severity of the lesion and the means to be used in order to meet the dangers, be this ligation of ruptured arteries nephrectomy, if possible, in completely crushed organs or simply, as in my case, removal of clots and blood, disinfecting of the cavity and packing with iodoform gauze, leaving the wound open for drainage and referring the question of nephrectomy to a future time.

That even in such a case nature can accomplish wonders and that nephrectomy may be superfluous, is well shown in this case.

A vote of thanks was extended the author for his excellent paper. Dr. W. T. Witherington of Paragould, Ark., contributed a paper on "A Case of Dislocation of the Spine."

A CASE OF DISLOCATION OF THE SPINE.

J. M. McLesky, aged thirty-five, white, section foreman on the St. L. A. & T. Railroad, on Sept. 7, 1888, was riding on the front end of a hand car, sitting down on the floor of the car in such a place and position as to be missed by the handle of the car in its motion. When colliding with another hand car coming in the opposite direction he placed his feet up against the flooring of the other and approaching car and by it was pushed backward under the descending handle of the car on which he was riding, which came down on his shoulders with great force, thus inclosing the length of the spine between the handle and floor of the car. The direction of the handle being slightly forward tended to double the spine forward, the bodies of the vertebræ acting as the fulcrum, the tenth and eleventh dorsal being about the central point strained. The ligaments about the posterior aspect these vertebræ gave way and the articular processes were separated. The upper segment of the spine was now pressed forward by the forward motion of the force above and the upper articular processes were forced forward and dropped in front of the superior articular processes of the vertebra below, and its apex resting on the pedicle of the bone below was held upward and the body thrown downward and forward, thus giving a forward curve to the spine, where it should be slightly backward, if varying at all from the erect posture.

It is easy to see from this pathology that reduction would be practically an

impossibility, since the leverage necessary to unlock the articular processes would greatly endanger the cord and since direct pressure against the anterior surface of the vertebræ was impossible.

I therefore directed my treatment to relief of the symptoms, evacuating the paralyzed bladder with catheter and washing out the bowels, allaying pain and promoting rest on the side by opiates. Local anti-phlogistics were employed the first two days. The patient was kept in the recumbent position, and the bowels and bladder having recovered from paralysis were allowed to move in bed. In about twelve days the patient was able, to turn himself in bed and soon got up to stool. There was, during the entire duration of his injury, but little disturbance to circulation or temperature, the temperature never rising above $101\frac{1}{2}$. Respiration was somewhat painful the first twenty-four hours, but soon improved. The lower extremities, which were paralyzed at first, resumed their functions in about thirty-six hours and were never afterward disturbed.

On Sept. 26, nineteen days after the injury was sustained, I had patient placed on cot and sent to hospital at Tyler, Tex., several hundred miles from place of injury. It may not be out of place to state that I refused to allow him to be transported immediately after the injury for fear of damage to the cord.

The patient from then on was under the skillful treatment of the chief surgeon of the railway hospital, who, I am told, applied a plaster of Paris jacket which was worn for nearly three months. The patient, who on April 20 came to my office, says that he has had no bad symptom, and that he is now employed as pumper at a tank on the railroad at Fisher. He has kindly consented to have his photograph taken, which I herewith inclose. The notch or depression shown at the point of injury indicates the distance between the spinous processes of the tenth and eleventh vertebræ, which it will be observed is very much increased by virtue of the abnormal position of the articular processes.

Had this been a fracture of the body of the vertebræ and crushing of it, or displacement of the inner articular fibro cartilage, these spinous processes would not have been so widely separated and patient would not have recovered so quickly. The interesting feature of this case to me is that I am not able to find a similar dislocation recorded anywhere resulting in final and permanent recovery of the patient.

Dr. G. K. Johnson of Grand Rapids, Mich., asked what provision had been made for the publication of the proceedings of the association. He desired as early a publication of them as possible.

Secretary Lewis stated that the constitution and by-laws which had been adopted provided for a committee on publication, consisting of the president, secretary and treasurer.

Dr. Thorn moved that the matter of the publication of the proceedings be referred to the committee on publication with power to act.

Dr. Hearne moved, as an amendment, that the matter be referred to the committee on publication with instructions and power to act one year from now.

It was then voted that the whole matter with reference to the publication of the proceedings be laid upon the table.

The meeting adjourned till 8 P. M.

EVENING SESSION.

The meeting reassembled at 8 P. M., the president in the chair.

Dr. R. Harvey Reed of Mansfield, O., read a paper on "Fracture of the Astragalus with Irreducible Displacement of the Fragment."

FRACTURE OF THE ASTRAGALUS, WITH IRREDUCIBLE DISPLACEMENT OF THE FRAGMENT.

Fractures of the astragalus as compared in frequency with fractures of the other tarsal bones are comparatively rare, while fractures of this bone with irreducible displacement is still more uncommon.

This bone being largely composed of cancellated tissue, and quite irregular in form and surrounded with numerous articulations, affords it a greater immunity from injury than almost any other one of the tarsal bones.

In fact, little is said in our text books regarding this important complication, which to the railroad surgeon is of double importance, owing to the permanent injury it produces and the consequent dangers this form of injury is liable to entail on the railroad company.

Hamilton, in his work on "Fractures and Dislocations," reports ten cases of fracture of the astragalus, nine of which were caused by a fall and one by crushing. In the former the force was largely reflected to the foot and conducted to the astragalus through the tibia, causing the fractures, some of which were followed by displacement of the fragments.

Ashhurst says it is almost invariably broken by the patient falling from a height and alighting on his feet, and that he only knew of two cases where there had been a fracture of this bone, with displacement of the fragment. The one was a case reported by himself, the other by Dr. Norris.

Agnew, in referring to fractures of the tarsus, reports seven fractures of the astragalus, fourteen of the calcaneum and twenty-five of the other bones of the tarsus, which shows that fractures of the astragalus only occur in 15 per cent. of all the fractures of the various bones of the tarsus.

Longdale, Croly, Neill, Bryant, Vollmar, MacCormac, M. Taignot, Maligne, M. Rognetta, Sir Astley Cooper, Clark, Norris, Goyder and John Ashhurst, Jr., each report a case of fracture of this bone, while Sheppard reports having observed four fractures of the astragalus and Mr. Erichsen two.

The testimony of these surgeons proves that it is usually caused by falling, in which the patient alights on some solid substance on his feet, whereby the force of the fall is extended to the astragalus, which may cause a simple fracture, with or without dislocation of the fragment, or a comminuted fracture, with or without displacement of the fragments, or a compound comminuted fracture, with or without displacement of the fragment or fragments. The fragment or fragments may be dislocated anteriorly on the dorsum of the foot, or downward and forward, or downward, outward and backward under the internal malleolus, and one case is reported in which the displaced fragment found its way to the plantar surface of the foot.

There is no certainty as to the direction of the line of fracture, which is as varied as the force or forces that produce it.

The reduction of these displaced fragments is quite a difficult task, which is usually attended with absolute failure, especially when they are displaced down-

ward and backward under either of the malleoli; and while Dr. Ashhurst reports in the "American Journal of Medical Sciences," for April, 1862, of having been able to replace a dislocated fragment of a fractured astragalus, yet I believe he is the only surgeon who has been able to do so (and has reported the case), to the best of my knowledge at least.

The anatomical relations of the astragalus are such that when displacement of a fragment after a fracture occurs it makes it evident at a glance that its reduction will be attended with great difficulty, especially when we consider its shape and structure, together with the numerous ligaments and articular surfaces it presents. Yet, notwithstanding all this, I consider it good surgery to make an honest and carefully conducted effort at reduction by trying to so manipulate the parts as to give the least possible resistance to its return, the particular manipulation of which will depend largely upon what part of the bone is fractured and displaced and where it is lodged. Operative interference for the removal or reduction of the bone, especially after prolonged and diligent efforts had failed to replace it, would very naturally present itself to our minds next. In this connection we can find but little data to guide us. While Bryant and Wythe operated and removed the displaced fragment with recovery, yet, on the other hand, a similar case, operated by Dr. Norris, died. These, in the absence of additional reports, would show a mortality of 33 per cent. against 66 per cent. of recovery, and at a time when at least two of these cases (Norris' and Bryant's) were undoubtedly operated prior to the use of antiseptics, and while we have no assurance that Wythe's was, although it is more probable than either of the other cases.

Some operators advise the replacement of the dislodged fragment, others the removal of the entire astragalus (which was done in Wythe's case), while others only advise the removal of the displaced fragment. But when we consider the structure of the bone, which is made up largely of cancellated tissue, and consequently more vascular, and hence the remaining portion of the bone is more liable to take on destructive inflammation on the one hand, while the replaced fragment is liable to become necrosed on the other, owing to the interference with the blood supply, as well as the danger of the introduction of septic germs, which makes the question of replacement by operative interference a doubtful procedure.

Again, if the displaced fragment is allowed to remain out of place it not only makes a permanent deformity, but a permanent disability. But on the other hand, if you attempt to remove only the fragment you take the chances of disease of the remaining portion of the bone following; and if you remove the entire bone there is more or less permanent deformity and disability from that. From this it would seem as though this injury produced a fair example of the old adage of:

"Damned if you do and damned if you don't,
Damned if you will and damned if you won't."

From this it would appear that we are left to the choice of four or five evils:

1. If the fragment can't be reduced by manipulation (excepting in compound or compound comminuted fractures) to simply let it alone and take the chances or it becoming encysted.
2. To remove only the displaced fragment by cutting down on it and extracting it antiseptically.
3. To remove the entire astragalus.
4. To replace the displaced fragment and take the chances of inflammation and destruction of both the hard and soft structures of the surrounding tissues.
5. To remove the displaced fragment and thoroughly cleanse the cavity it left and put all the surrounding parts in a strictly aseptic condition, after which

pack the cavity with Senn's antiseptic decalcified bone chips, which I believe is better than replacing the detached fragment of bone, as it is very hard to make this strictly antiseptic, while the decalcified bone chips are, and hence less liable to set up infection in the surrounding parts.

REPORT OF CASES.

Case 1.—George M., aged fifty-five, an amanuensis, on Aug. 12, 1885, was riding with a friend in a delivery wagon when the horse took fright and started to run away. Mr. M. became alarmed and jumped out of the wagon on the paved street, sustaining a fracture of the astragalus of the left foot, with displacement of the fragment downward and backward under the malleolus. The internal fragment was also slightly displaced backward and inward, thus lengthening the lateral diameter of the ankle quite considerably. The foot and ankle soon swelled up and became very painful. A physician was called, who pronounced it a *bad sprain* of the ankle and treated it accordingly.

Some months subsequently the writer was called and found a fragment of the astragalus, about two inches in length and nearly as wide, lodged under the left external malleolus, while the depression caused by the displaced fragment was easily detected, just beneath, inward and in front of the fibula. All attempts at reduction were without avail, but notwithstanding the marked deformity the patient could use his foot fairly well and had quite a considerable degree of motion, but it was more or less painful and was a source of inconvenience to him all the time, and especially so in changeable weather. Later on necrosis of the external metatarsal bone set in, and at one time it was thought that the entire foot would have to be amputated. An excision, however, of the external metatarsal was all that was necessary, since which time he has had but little trouble with it, other than what we have already mentioned.

Under all the circumstances I considered that conservative surgery in his case was a choice of the least evil, and hence refrained from excising the displaced fragment. The result is that this patient is now able to walk all over the city with the aid of a cane, and while his foot and ankle are stiff and clumsy, I believe it is better than to have risked an operation for its removal.

Case 2.—Chas. S., aged twenty-nine, a brakeman in the B. & O. yards at Mansfield, O., was thrown off the top of a box car by a broken brake, May 13, 1889, alighting on his feet on the end of a tie, sustaining a fracture of the astragalus of the right foot, with displacement of the fragment underneath the internal malleolus.

I was called shortly after the accident and readily diagnosed the nature of the injury, as I could easily feel the displaced fragment beneath the internal malleolus, while beneath and in front of the internal half of the tibia I could readily discover the depression left by the escaped fragment of bone. In addition to this there was some spreading of the tibia and fibula, thus materially increasing the lateral diameter of the ankle, no doubt due to the tearing of the ligaments and the strain produced by the fall, together with the escape of such a large fragment of bone, with its associate weakening of the surrounding parts.

Here again we were confronted with the question of an operation for the removal of the displaced fragment of bone, which no ingenuity or manipulation the author could devise was able to replace.

In its present location we recognized a degree of support to the tibia, being lodged immediately underneath the internal malleolus, which support would be lost by its removal, saying nothing of the danger attending the operation to the

surrounding structures, and again conservatism got the better of us and we decided to let well enough alone. The result is a more or less painful ankle at times, with considerable loss of motion and some deformity, but otherwise a fairly good foot and leg, which enables him to walk reasonably well and earn a good livelihood for his family.

Case 3.—Harry D., a stonemason, aged thirty-three, jumped off a freight train when it was in motion, Oct. 8, 1889, and lit with one foot on the end of the tie, producing a fracture of the astragalus of the right foot, with displacement of the fragment underneath the external malleolus. The author was called to see the patient a short time after the injury and found a fragment of the astragalus some two inches in length by one inch in width lodged just beneath and slightly posterior to the coronoid process of the fibula. A marked depression was observed just below, in front and internal, to the external malleolus, which was evidently the nidus of the displaced fragment of the bone. In the absence of sufficient data to encourage an operation and with the dangers that might attend such staring me in the face, I again resolved to pursue the conservative method of treatment until something better presented itself to my mind as unquestionably an improvement on the conservative methods I had thus far been forced to adopt.

The results in this case are much better than either of the former cases. The patient has little or no pain, except when the weather changes, and is not inconvenienced to any extent; can walk with limping but little, and is regularly following his daily avocation as a stonecutter.

The following interesting case was kindly given me for this paper by my friend, Prof. Thorne of Toledo, O., surgeon-in-chief of the Toledo, St. Louis and Kansas City Railroad.

Case 4.—H. F., a German, aged thirty-two, weighing about 200 pounds, a lager beer brewer, and given to the liberal use of this fluid, while at work slipped from the lower round of a ladder, alighting upon a wet floor. The peculiar position of landing, together with the great weight of the patient, were such as to result in a fracture of the astragalus of the left foot, forcing the outer half out from its normal position, and causing quite a prominence over the outer portion of the dorsum of the foot.

A corresponding diagnosis was made, and the injury treated accordingly. In about thirty days after the accident complete death of the overlying structures ensued, necessitating the removal of the displaced fragment of bone. This was followed by decomposition and infection, which was no doubt encouraged by his constitutional condition, and the result of his intemperate habits, until it was necessary to amputate his leg below the knee, in order to save his life.

Here we have a case where conservative surgery was followed with disastrous results which probably lost the patient his foot.

In summing up the testimony of this unfortunate injury, we have found that, in fractures of the astragalus with displacement of the fragment:

1. That reduction is the rare exception, and not the rule.
2. That total failure to reduce the fragment is the general rule in this class of cases.
3. That these cases may get well with a fairly good and useful ankle by following a conservative method of treatment.
4. That a conservative line of treatment may be followed with disastrous results.
5. That a fair degree of recovery may follow the excision of the dislocated fragment.

6. That destructive inflammation of the remaining portion of the astragalus may follow with necrosis, necessitating its ultimate removal.

7. That a fracture involving any considerable portion of the astragalus, with displacement of the fragment, is practically if not almost invariably followed with a permanent and irreparable injury; for if resolution follows without an operation, there is a permanent deformity with associated disability, or if the fragment is removed and the patient recovers, there is a permanent disability; or if the entire astragalus is removed, as advised by some authors, there is still a fixed disability.

It seems to me that *one* of the plain lessons we are to learn from the study of these cases is to be very guarded in our prognosis, in fractures of the astragalus with irreducible displacement of the fragment; for if we are not we may rue our rashness under the lash of chagrin and disappointment.

Another plain lesson seems to be stamped upon the clinical history of this class of cases; and that is, to be equally as guarded in operating them as you are in projecting your diagnosis.

But, when an operation for the removal is your plain duty, do it promptly, under the strictest antiseptic precautions, and if you have any doubt as to the danger of necrosis of the remaining portion of the bone remove that also. Where this is not evident, it might be well to consider the advisability of packing the cavity produced by the displaced fragment of bone, after thoroughly cleansing it, with Senn's decalcified bone chips, being careful to remove all the synovial membrane before packing the cavity; for the use of these decalcified bone chips as used by Prof. Senn, after the removal of portions of dead bone, has been so satisfactory, that we believe their use in this class of cases would be followed by satisfactory results also.

Dr. Solon Marks of Milwaukee, Wis., in opening the discussion on this paper, said: I have had some experience in this matter. I differ with Dr. Reed in one thing, that where the fragment is irreducible there is more or less pain, and I am quite sure we will have better results if the fragments are removed antiseptically. In the case I operated on, the result was good. I believe that, as a rule, they should be removed, because patients suffer more or less pain. I am, therefore, in favor of resecting away the displaced fragment if it cannot be reduced, as there is apt to be ulceration or necrosis.

Dr. Herman Mynter of Buffalo, N. Y., doubted whether fracture of the astragalus could exist without dislocation. He did not remember of ever seeing such a case. He was inclined to think as the preceding speaker that conservative treatment was out of place, and that better results would follow operative treatment.

Vice-President Pettyjohn then took the chair and President Outten proceeded to deliver his annual address.

PRESIDENT OUTTEN'S ADDRESS.

The progress of the railway has ever been a fruitful theme for the political economist; its extent; its influence upon the social body; its capacity for creating and moulding centers of population, influencing every avocation in life, changing the physical face of nature, annihilating distance, changing communities by inter-

course, spreading energy and intelligence, developing every region brought in contact, producing wealth in all directions, this ease and celerity of contact developing the best elements contained in our race; full of the most powerful elements which constitute our existing civilization; a veritable world in itself, employing millions of persons in its operation; no position in life being free from its influence, professions used in a more extended manner than ever before; changing and adapting by the sheer force and power contained within them the character of professions used by them according to the growth, wants and protection, enlarging the scope of action of certain professions and moulding them in spheres both important and extensive; the application of immense power, rapidity of motion, and multitudinous adaptation of machinery necessarily incurring danger by defying many of the laws of nature, its operations creating injuries of a definite and almost specific character, the medical profession is needed and required and moulded according to the exigencies of its operations.

The history of the medical profession's connection with the railway has been one of slow and doubtful recognition viewed in the light of a necessary evil; always coming with seeming misfortune; judged by a pre-existing prejudice; grudgingly rewarded and employed almost amid uttered or unuttered protest. Being necessary and expensive the keen business executive of the railway has used various devices to economize and still command the profession; using the influence of a doubtful position, and of that most potent, over-estimated, vanity-producing, soul-soothing and far-reaching unknown quantity, a pass, it has made collections for well-earned fees arduous and uncertain, using the profession at times to warp the truth, which always proved detrimental to both, engulfing individuality, ignoring and changing the nature of the surgeon's avocation from an honorable surgical standard to one of doubtful legal cast, appreciated and treated capriciously, defining his true position rarely on account of the intermittent character of his services. Even now in a goodly number of instances he is employed ostensibly for his ability from a professional point of view but too frequently used with this unconsidered for work in fields foreign to the true nature of his profession. Some of the profession think that the railways employ them for the purpose of defrauding justice, controverting truth and exercising functions of a generally questionable character. There is no middle or doubtful course for the profession; if they do not maintain the noble dignity of their calling certainly none outside are likely to. No physician in the service of a railway company can afford to lose his individuality. He is employed for specified purposes professionally, and to be of the best use must exercise them with strict conformity to this. The very instant he swerves from the real standard of his calling his effectiveness ceases, and it is only a short time when distrust becomes a potent factor only to ultimately be an object of suspicion and contempt by those employing him.

The physician in the service of the railway company in order to be of genuine use must ever subserve the real purpose of his avocation. True and honest as regards his ministrations, employed purely for professional capacity to accomplish solely surgical results, ever maintaining honorably the duties required from both patient and company. No railroad can afford to sustain a weak, vacillating, dishonest official and no honorable, high-minded, zealous and truly devoted physician can afford to serve a company except upon the true and noble nature of his calling. The true physician ever estimates the real value of his services, when he underestimates his value the world views and judges it according to the estimate so placed. The really valuable man is the one who is true to his calling, honest in his administration, unswerving in his devotion to the true standard indicated

Honesty, industry, faithfulness, humanity are its foundation elements; these ignored, the true physician ceases to exist and becomes a servile creature to venal circumstances.

The best of talent manages the railways of our country and in many instances the proper professional standard is understood and demanded and every chance given to the surgeon to develop and utilize his capacity. Appreciated, trusted and employed solely by the virtue of his standing in the profession he has become an economical element in its managements, being placed in positions of executive authority and granted the privilege of growing and developing along with some of the great systems now being evolved. It has been the West first to fully appreciate his services. Not until, however, the railways had extended over trackless plains or wound their way among tortuous canyons of mountain ranges in thinly or unpeopled regions was he considered an integral part of a railway. He is now acknowledged as an essential factor in the management of thirty-nine lines and systems on which he is employed as chief surgeon and managing departments in his professional capacity over nearly 76,000 miles of railway. There are thirteen hospital departments upon some of the largest systems in the country, owning twenty-five hospitals and treating annually over 136,000 sick and injured employes. All of these departments are self-sustaining and supported by assessments levied upon their employes, in a majority of instances the assessment being from twenty-five to fifty cents a month. They enable the employe to be removed from unhealthy regions to more healthy ones, concentrate the injured and supply advantages not otherwise to be obtained. The management furnish passes to and from any part of the line, as deemed best by the surgeons in charge of its hospitals and emergency stations, and employes are thus brought to hospitals from malarial portions of the country to non-malarial, and it is possible for its humblest employe to change from bad to more healthy and salubrious climes. The hospital department is able to effect cures by the fact of this change which otherwise could not be accomplished.

The departments are enabled to send the consumptive to climes better fitted for his treatment and cure, which a lack of means on the part of the employe would oftentimes debar. The employes assert that they save money by paying the assessments which constitutes a hospital fund, as prior to their establishment sick and injured employes were helped out by co-employes and friends contributing to subscription lists carried about by the generously inclined, and that it was not uncommon for the men to give, under such circumstances, fifteen, twenty or more dollars a year for such purpose. But since the establishment of the hospital departments those who needed assistance in this direction rarely need it now, as twenty-five and fifty cents a month paid in assessments entitles them to the best care and treatment and they are under obligations to no one. The men say that, while some might doubt the right of assessments, still this point was not now considered in view of the benefit rendered to those who really needed it. While some might not partake of its benefits, many good and worthy persons were accorded the best of care and attention without humiliating circumstances connected with it. All diseases except those arising from vicious acts are treated, prominent specialists are employed by many of the hospitals, the oculist, aurist, throat and lung specialist, dermatologist and bacteriologist, [a regular staff of surgeons enabling the employe to receive treatment at the hands of some of the best men in the profession at no extra cost. Prescriptions are filled and sent out, trusses, elastic bandages, preventive measures and vaccination are employed in many thousand cases. The experience acquired by hospital surgeons in treating a great number of rail-

way injuries enables them to accomplish better results than when a surgeon only treats them in isolated instances. The departments are well supplied with means and its hospitals possess paraphernalia and armamentariums of superior stamp and not confined by necessities and rules governing eleemosynary institutions. They have stood the test of time (even amid strikes) for many years and must certainly possess merit, as the compulsory elements of the assessments would naturally produce prejudice unless some redeeming virtue was constantly manifest. The small assessment is not deemed a burden by the employes and the departments are viewed as a benefit. They relieve the states through which the roads pass in many cases of pauperism, as without them many persons would be thrown upon the care of the state. They have been the means of saving innumerable lives and by judicious advice and preventive measures saved the employes both time and money. These departments are the best possible form of charity, as work and independence are involved and not idleness and dependence. Thus the union of the railway company and the contributing employes has evolved an institution of greater benefit at less cost to its beneficiaries than any similar institution yet devised.

By an interchange of patients from one system of hospitals to another their benefits could be greatly broadened, the consumptive and malarious patient sent to non-malarious and mountainous regions, the rheumatic and catarrhal to more congenial climes of the South, and by this climatic interchange many worthy and valuable lives benefited and saved at no extra cost to either hospital department. These hospital departments, managed for the humane purposes intended and in close alliance with the claim departments, recording a complete history of every injury, giving truthful and early statement, being cognizant of the real condition of the injured, constitute the best element of settlement and a corresponding lessening of litigation, being essentially economic and humane in their basis.

A well-organized hospital department with complete medical staff is susceptible at but little expense of being utilized in all measures pertaining to prevention. It can attend to hygienic elements pertaining not only to the individual, but to the physical condition of the road, give guidance to the individual as to the best manner of caring for himself, train him in the way of using that which is best for his health and avoid those things which are hurtful. In no field can be greater humanity shown than in this. In no field can be greater good accomplished, as it means the saving of time, money and suffering to many persons that could not be taught or reached other than in the manner thus indicated. It can be utilized to study the unhygienic surroundings environing the road, analyze all waters, indicating those which should be used and those which should not be used, the proximity of the water supply to doubtful and dangerous places, remedy unhygienic conditions as regards cars, shops, buildings and other places and inspect every source from which ill health seems to result. The proper sanitary work upon any road would not only be for the better being of the employes, but to the community, and in time of epidemics be a most potent force in accomplishment of results beneficial to the state at large. Accumulating intelligence on all sides and the natural tendency toward the organization of classes in various protective associations—the result of conditions previously existing—make it imperative upon the part of corporations to study the impelling motives which caused this and the remedy best suited. The broadest and most humane course offers the least chance of differences.

The ranks of employes in the railway service abound with persons of hard, good common sense, and as thoroughly appreciative of that which is just and humane as any class of men could be; discerning, practical and generous, appreciative of merit, competent by unceasing contact with many people and many places to be

their own judges, self-reliant, quick to discern virtue and make it known. We find after fourteen years of experience in this character of work and frequent talks with all classes of employes that they naturally (like all other men) predicate the appreciation of the various plans employed by the railway for economy and relief be it insurance or hospital department, upon their cheapness and extent of service naturally desiring to manipulate their insurance through the various organizations with which they are connected or accident companies just in proportion to the own desire and ability. If compelled to pay and aid in sustaining any of the institutions of course they select the class which costs the least money and give according to their ideas the greatest amount of benefit. Their own protective associations already formed and embodying excellent plans of insurance, both regards life and permanent disability, make them favor the plan which benefits them most in their frequently dangerous avocations, hence the popularity in certain regions of country of a well-conducted hospital department. It can be stated with almost absolute certainty if the hospitals were deemed a burden and did not possess merit they would have soon ceased amid most violent and determined protest; that they still exist and continue in growth plainly indicates that they are deemed of value by the employe, for compulsion is the basis which readily and ultimately arouses all that is combative when deemed unjust. We can state with perfect truth that the employes view them not only with decided favor but have expressed a willingness to contribute more in the event it is needed and have stood increased assessments on more than one occasion.

Let but the railroads honestly endeavor by kind treatment and humane efforts to better the condition of the employe in any direction and they will at all times meet with intelligent, hearty, earnest and honest appreciation. If the hospital departments are extended so as to include all the best known means of cure and treatment, including the extended climatic interchange of patients from one department to another, the establishment of a perfect system of hygienic effort, considering humanely as far as possible the well being of all employes, which could be done at little cost to either, great good would certainly result. It would be economy for the railway and benefit for the employe, not burdensome to any concern obtaining the greatest benefits at the least possible cost, co-operative in the sense in which both parties do their best according to their respective ability.

Dr. Stemen made a few complimentary remarks on the address. Dr. Morton moved that a copy of the president's address be sent to the general manager of every railroad in the United States, Canada and Mexico. Carried.

Dr. Reed suggested that as there was only one more paper in the programme to be read and the author was not present the paper could be read by title and referred to the committee on publications and that after the transaction of some miscellaneous business the association could adjourn to meet in Hot Springs, Va. The remarks on being put in the form of a motion were seconded and carried.

Retiring President Outten then introduced the president-elect Dr. J. H. Murphy of St. Paul, Minn. Dr. Murphy in taking the chair made a few timely and appropriate remarks.

The chairman of the executive committee submitted the following reports:

Your executive committee beg to report that they have examined the books of the treasurer, recording secretary and also of the official publishers, Dr. C. B. Stemen, and find that so far as they are connected they agree and are correct, and that the accounts are well kept.

C. K. COLE, *Chairman*.

Your executive committee beg leave to report as follows: We recommend that the annual dues for the coming year be fixed as heretofore at three dollars (\$3), and that the fund thus collected be applied as heretofore.

C. K. COLE, *Chairman*.

The nominating committee beg leave to submit the following supplementary report:

We recommend and nominate the name of Dr. Hugh M. Taylor of Richmond, Va., for assistant secretary on account of change in place of meeting.

For members of the committee on arrangements at Hot Springs—Dr. O. L. Rogers, Covington, Va.; Dr. J. F. Hughes, Clifton Forge, Va.; Dr. George Ross, chairman, Richmond, Va.; Dr. C. W. P. Brock, Richmond, Va.; Dr. H. M. Taylor, secretary, Richmond, Va.; Dr. G. M. Nickell, Millboro, Va.

Respectfully submitted,

THE NOMINATING COMMITTEE.

The executive committee, to whom was referred the matter of names to be placed on the honorary list, beg to submit the following names:

Nicholas Senn, M. D., Ph. D., professor of surgery in Rush Medical College, Chicago, Ill.

W. W. Dawson, M. D., LL. D., professor of surgery Medical College of Ohio, Cincinnati, O.

Charles M. Hays, general manager Wabash system, St. Louis, Mo.

W. E. Jones, general claim agent Missouri Pacific Rd., St. Louis, Mo.

Hon. Alexander Cochrane, general solicitor Missouri Pacific Rd. St. Louis, Mo.

Hon. Frank Jones, president Boston & Maine Rd., Portsmouth, N. H.

James E. Childs, general manager New York, Ontario & Western Rd.

Hon. Frederick Smyth, president Concord & Montreal Rd., Manchester, N. H.

G. W. Stevens, general manager Chesapeake & Ohio Rd., Richmond, Va.

S. H. H. Clark, general manager Missouri Pacific & Union Pacific Rd., St. Louis, Mo.

Frank B. Clark, traffic manager St. P. M. & O. Ry., Omaha, Neb.

S. E. Williamson, general counsel N. Y. C. & St. L. Ry., Cleveland, O.

G. W. Bartlett, general superintendent B. R. & P. Ry., Rochester, N. Y.

Lewis Williams, general superintendent N. Y. C. & St. L. Ry., Cleveland, O.

W. C. Brown, general manager Hannibal & St. Joe Ry., St. Joe, Mo.

S. E. Crance, general superintendent Hannibal & St. Joe Ry., Brookfield, Mo.

J. B. Yohe, master transportation P. L. & E. Rd., Pittsburg, Pa.

C. D. Law, superintendent western division P. F. W. & C. Ry., Fort Wayne, Ind.

A. B. Starr, superintendent eastern division P. F. W. & C. Ry., Allegheny, Pa.

Joseph Wood, general manager Pennsylvania lines west of Pittsburg, Pittsburg, Pa.

Geo. W. Holdridge, general manager B. & M. Rd. in Omaha, Neb.

Col. Orland Smith, first vice-president B. & O. Ry., Baltimore, Md.

Capt. W. W. Peabody, first vice-president B. O. Southwestern R. R., Cincinnati, O.

Dr. John McIntyre, St. Louis, Mo.

Mr. Charles Truax, Chicago, Ill.

Dr. Thomas H. Manley, New York City, N. Y.

A. L. Mohler, general manager Great Northern Ry., St. Paul, Minn.

R. Bell, general manager W. N. Y. & P. Ry., Buffalo, N. Y.

F. M. Gault, general manager C. & St. L. Ry., Council Bluffs, Ia.

C. H. Ackert, general manager Iowa C. Ry., Marshalltown, Ia.

Edmond L. Tyler, general manager A. & W. P. Ry., W. Rd. of Ala., Atlanta, Ga.

R. C. Richards, general claim agent C. & N. W. Ry., Chicago, Ill.

Roswell Park, A. M., M. D., Buffalo, N. Y.

Herman Mynter, M. D., Buffalo, N. Y.

J. M. Edwards, vice-president and general manager L. N. O. & T. Ry., Memphis, Tenn.

O. H. Pond, superintendent B. S. & H. Ry., Columbus, O.

T. M. Peelar, general superintendent T. & O. C. Ry. and K. & O. Rd., Toledo, O.

Roswell Miller, president C. M. & St. P. Ry., Chicago, Ill.

Dr. Stemen moved that the reports of the executive committee be adopted as read. Carried.

Dr. Conn moved that a vote of thanks be tendered to Dr. Gumaer for his particular attention to the members of the association, to the medical profession of Buffalo, to Dr. and Mrs. Daggert for their kind reception and to the management of all railroads that furnished transportation. Carried.

Dr. Outten thanked the ladies on the reception committee Thursday night for the beautiful bouquet they had presented to him as presiding officer.

There being no further business the association adjourned to meet in Hot Springs, Va., the date to be fixed by the executive committee.



APPENDIX A.

CONSTITUTION AND BY-LAWS
OF THE
National Association of Railway Surgeons
AND
LIST OF OFFICERS, COMMITTEES AND MEMBERS,
ADOPTED APRIL 30, 1891.

CONSTITUTION.

ARTICLE I.

NAME.

The name of this Association shall be called "The National Association of Railway Surgeons."

ARTICLE II.

The objects of this Association shall be to promote acquaintance and fraternal relations among railway surgeons, to secure interchange of ideas and the adoption of the best methods to the development and improvement of railway surgery, and to establish it as a special branch of the surgical art.

ARTICLE III.

MEMBERS.

There shall be two classes of members, Active and Honorary. The active members shall be surgeons of railway companies at the time of their admission to membership, provided, however, that when a surgeon is once a member his retirement from the service of the company shall not forfeit his membership.

The honorary members shall comprise such persons not necessarily railway surgeons as may from time to time be elected by a two-thirds vote of this Association.

ARTICLE IV.

OFFICERS.

The officers of this Association shall consist of a President, seven Vice-Presidents, a Secretary and Assistant Secretary, a Treasurer, and an Executive Committee of seven, who shall serve until their successors are elected.

ARTICLE V.

DUTIES OF OFFICERS.

SECTION 1. The President shall preside at all regular and special meetings, and perform all the other duties that custom and parliamentary usage may require, and deliver an address at the meeting over which he presides.

SEC. 2. In the absence of the President, the Vice-Presidents shall perform the duties of his office in the order of their election.

SEC. 3. The Secretary shall keep a record of the proceedings of all meetings and draw all orders on the treasury for the payment of the bills.

Shall attend to all correspondence of the business of the Association, notify all members of meetings, and upon request of the Chairman, give notice of meetings of committees during recess of the Association, and upon request of the President shall issue such circular letters regarding the business of the Association as may be deemed desirable, and shall be ex-officio a member of the Committee on Arrangements.

SEC. 4. The Treasurer shall have immediate charge of the funds and property of the Association, shall collect all dues, giving his receipt therefor, and shall give bond to the President to faithfully account for all funds coming into his possession belonging to this Association, the amount of the bond to be determined by the Executive Committee. He shall also make a written statement to the President of the financial condition of the Association within one month after the annual meeting. He shall communicate each year with all the members who have not paid their annual dues and solicit payment of the same.

SEC. 5. The Executive Committee shall fix the annual dues and membership fee, subject to the approval of the Association, and act as a committee on credentials, audit all accounts, and, in conjunction with the other officers of the Association, hold any necessary meetings in the interval between sessions deemed desirable and necessary in the interests of the Association, and such conjoined action shall be deemed an action of the Association as a whole.

ARTICLE VI.

AMENDMENTS.

No amendment or alteration shall be made of any of these articles except at the annual meeting next subsequent to that at which such an amendment or alteration may have been proposed, and then only by the voice of two-thirds of all the members in attendance.

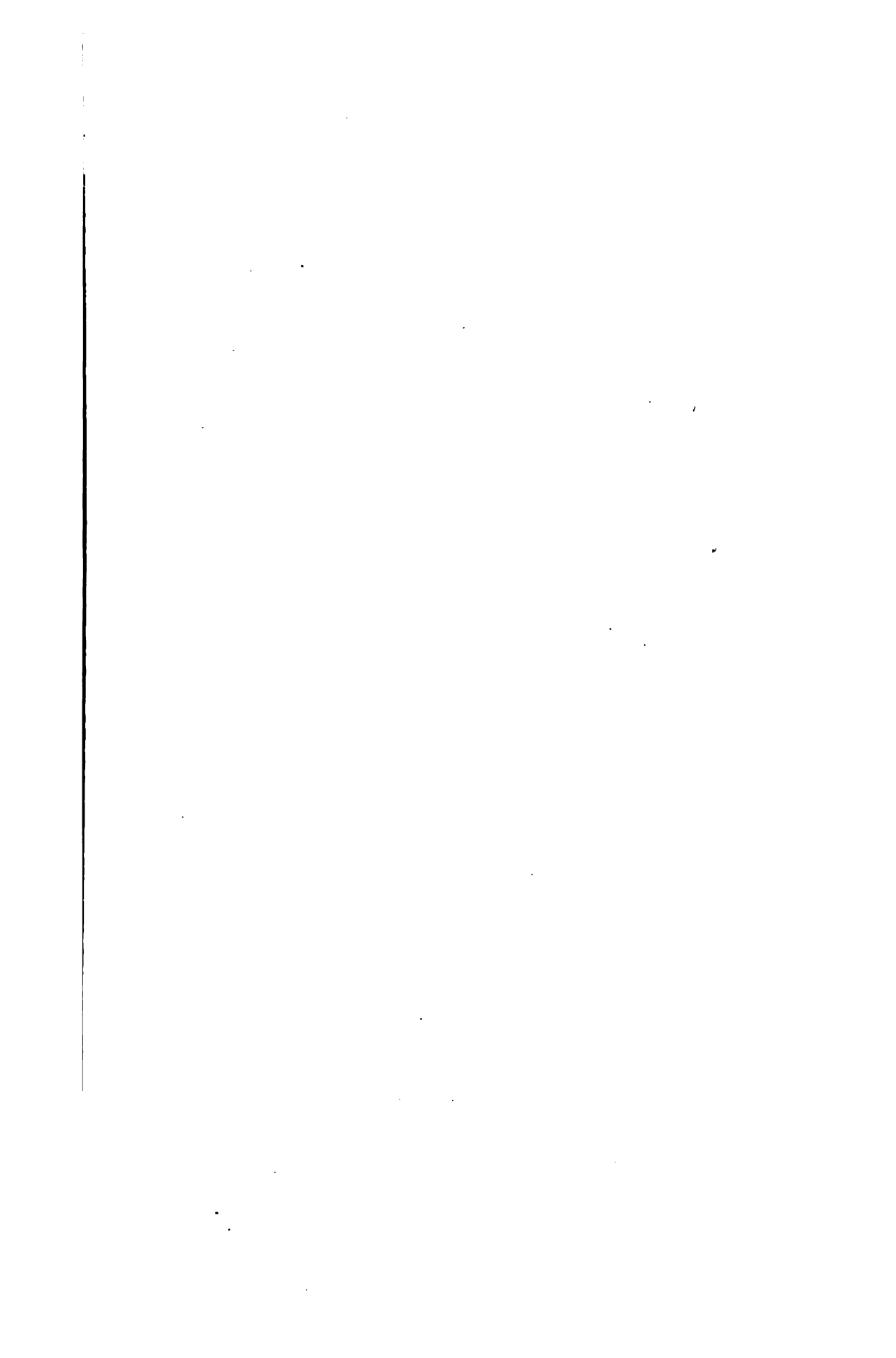
BY-LAWS AND RULES OF ORDER.

The order of business at the annual meeting of this Association shall at all times be subject to the vote of two-thirds of all the members in attendance and until permanently altered, except, when temporarily suspended, it shall be as follows:

- 1st. Roll call.
- 2d. Reading minutes of previous meeting.
- 3d. Report of Executive Committee on the credentials of members.
- 4th. Selection of nominating committee, afternoon of first day.
- 5th. Election of officers, afternoon session, second day.
- 6th. Reports of committees and officers.
- 7th. Report of cases.
- 8th. New business.
- 9th. Reading and discussing papers.
- 10th. Unfinished business.
- 11th. Adjournment.

STANDING COMMITTEES.

- 1st. Committee on Arrangements.
- 2d. Committee on Transportation.





CHAIRMAN EXECUTIVE COMMITTEE C. K. COLE, M. D., HELENA, MONT.

- 3d. Committee on Necrology.
- 4th. Committee on Publication.
- 5th. Nominating Committee.

DUTIES OF COMMITTEES.

1st. The Committee on Arrangements shall be composed of five active members of this Association, the majority of whom shall be residents of the town or city in which the annual meeting next succeeding their selection is held. They shall be required to provide suitable accommodations, including committee rooms, together with a list of hotels and rates per day, to receive and announce all essays and memoirs, and publish the title and name of the author of the same in the programme for the meeting, which programme shall be sent to all members entitled to seats in the annual meeting at least three weeks prior to the date of such meeting, and make any other necessary arrangements.

2d. It shall be the duty of the Committee on Transportation to ascertain the terms and conditions upon which the various railway lines will carry the members to and from the place of meeting, and to notify each member of the Association through the Committee on Arrangements, or otherwise, of the same, at least one month prior to the annual meeting.

3d. The Committee on Necrology shall report annual brief biographical notices of deceased members, and preserve statistical and other memorial records of the society.

4th. The Committee on Publication shall be composed of the President, Secretary and Treasurer, and shall have charge of preparing for the press such of the proceedings of the society as may be ordered to be published. And they shall have full discretionary power to omit from the published transactions any part or whole of any paper that may be referred to it by the Association, unless especially instructed to the contrary by the vote of the Association.

5th. The Nominating Committee shall consist of seven members to be appointed by the President of the Association at the afternoon session of the first day of the meeting of the Association. It shall be the duty of this committee to report to the Association, at the opening of the afternoon session on the second day, a list of nominees to fill the offices and standing committees provided for in these By-laws; also to nominate the place of meeting for the next annual session.

MEETINGS.

The annual meeting of this Association shall be held between the first and last Mondays of May in each year, at the place agreed upon by the Association the preceding year; the particular date to be fixed by the Executive Committee, and notice sent to each member of the Association not later than October of the current year. The session shall continue three days, or until all the business of the society is completed and a formal adjournment had.

Special meetings may be held upon the call of the President of the Association, signed by the Secretary, at the request of a majority of the officers and Executive Committee, and the business to be considered must be specified in the notification to be sent to each member of the Association.

QUORUM.

The members present at any regular or special meeting shall constitute a quorum, and the majority vote decides all questions, unless otherwise provided for.

ELECTIONS.

The election of officers, and the vote by which the place of holding meetings is decided, shall be by ballot.

RULES.

The rules of conducting business shall in all cases, as far as they are applicable and not incompatible with the Constitution and By-laws of this Association, be those in "Cushing's Manual"

MISCELLANEOUS.

No report or other paper shall be entitled to publication in the journal for the year in which it shall be presented to the Association, unless it be placed in the hands of the Committee on Publication on or before the first day of July.

Any active member who shall fail to pay his dues for two successive years shall be dropped from the roll of active members, after having been notified by the Treasurer of the forfeiture of his membership.

Anyone appointed on a special committee who fails to report at the meeting next succeeding the one at which he is appointed shall not be continued on such committee, or appointed on any other, unless a satisfactory excuse is offered.

AMENDMENTS.

Resolutions amending, repealing or adding to these By-laws shall require a two-thirds vote of the members present.



APPENDIX B.

HISTORICAL SKETCH OF THE NATIONAL ASSOCIATION OF RAILWAY SURGEONS BY DR. R. HARVEY REED OF MANSFIELD, O.

To the late Dr. A. W. Ridenour of Massillon, O., can be traced the original idea which led to the organization of the National Association of Railway Surgeons. At the meeting of the association of the surgeons of the Pennsylvania Railroad Company, in the fall of 1887, at Alliance, O., he presented the following resolutions, which he had prepared prior to the meeting, and which were unanimously adopted:

Resolved, That it is to the best interest of the various Railway Surgeons' Associations, the companies they represent, and Railway Sanitation, that a biennial meeting of the railway surgeons, representing as many roads as may be induced to respond, be held.

That this association take the initiatory steps by sending out invitations to the various Railway Surgeons' Associations and to the chief surgeon of the roads where no associations exist, or to individual surgeons where no chief surgeon exists, to meet either at Pittsburg, St. Louis, Chicago, Philadelphia or New York, there and then to perfect an organization to be known as "The American Association of Railway Surgeons."

That a committee of five be appointed to act in the matter.

Dr. L. Firestone, who was president of the association of the surgeons of the Pennsylvania Railroad Company, in compliance with the above resolutions, appointed the following committee:

Dr. S. S. Thorne, Chairman, Toledo, O.

Dr. J. J. Buchanan, Secretary, Pittsburg, Pa.

Dr. J. H. Tressel, Alliance, O.

Dr. C. B. Stemen, Ft. Wayne, Ind.

Dr. A. W. Ridenour, Massillon, O.

The next meeting of the association of surgeons of the Pennsylvania Railroad Company was arranged to be held in Ft. Wayne, Ind., in May, 1888.

During the interval between these two semi-annual meetings the chairman, Dr. S. S. Thorne, and the secretary, Dr. J. J. Buchanan, corresponded with quite a number of railway surgeons and general managers of the various railways in the interest of the new organization.

But, notwithstanding the numerous favorable replies received, the secretary remained in doubt as to the utility of such a meeting and the ability of the committee to carry it into successful execution.

Dr. Thorne of Toledo, O., and Dr. Ridenour of Massillon, O., were more hopeful, and continued to agitate the question of organizing the new association. The following letter was issued some time after the meeting:

Dr.

Dear Sir: As you are aware, the inclosed resolution, offered by Dr. A. W. Ridenour of Massillon, O., was adopted at our last semi-annual meeting, also that the president, Dr. L. Firestone, appointed the following:

*Dr. C. B. Stemen, Chairman.

Dr. J. J. Buchanan, Secretary.

Dr. S. S. Thorne.

Dr. J. H. Tressel.

Dr. A. W. Ridenour.

Dr. C. B. Stemen, who, prior to this time, had not been actively identified with the movement, now came forward as an active advocate of the new association

*It will be notice that the committee is changed slightly from the original committee appointed at Alliance.

and made use of the Ft. Wayne "Journal of Medical Science" (of which he was editor) in aid of the new enterprise.

A special notice was given in that journal that at the meeting of the surgeons of the Pennsylvania Railroad Company to be held in Ft. Wayne, May 15, 1888, it was very much desired that all of the surgeons should attend the meeting to make arrangements for the national meeting to be held at Chicago June 28, following.

At the Ft. Wayne meeting of the surgeons of the Pennsylvania Railroad Company, held May 15, 1888, the question of the new organization was brought up and freely discussed by those who were present. But owing to the absence of some of the members of the original committee a new committee was appointed, consisting of

Dr. C. B. Stemen, Chairman, Ft. Wayne, Ind.

Dr. J. H. Tressel, Alliance, O.

Dr. R. L. Sweney, Marion, O.

Shortly after the Ft. Wayne meeting this new committee issued the following circular letters, the one to the managers of the various railroads of the United States and the other to the surgeons of the same:

FORT WAYNE, IND., May 28, 1888.

.....,

General Manager.

Sir: The inclosed circulars are to be sent to the surgeons of your road. Will you be kind enough to have them sent to all the local surgeons on your lines?

The National Association of Railway Surgeons will, we trust, do much to advance the interest of railway surgery in this country, and we desire your co-operation in this movement of organizing a national association of the surgeons whose duty it is to take care of the injured employees and passengers.

Will you arrange for transportation for all who may desire to attend the meeting at Chicago? We very much desire that your company shall be represented at this meeting.

Yours truly,

C. B. STEMEN, M. D.,
J. H. TRESSEL, M. D.,
R. L. SWENEY, M. D., } Committee.

NATIONAL ASSOCIATION OF RAILWAY SURGEONS.

Dear Doctor:

The committee for making arrangements for a national meeting of railway surgeons met in the city of Ft. Wayne, Ind., on the 15th of May, 1888, and decided to hold a meeting in the city of Chicago, in Parlor O of the Palmer House, on the 28th day of June, at 9:30 A. M.

It is very desirable that you attend this meeting and assist in organizing the National Association of Railway Surgeons. Every surgeon who is in the employ of any railroad company is invited to this meeting.

We shall be glad to have you prepare a paper to read at the meeting or to report any case of interest to the association. If you desire to do so it would be well for you to notify Dr. C. B. Stemen of Ft. Wayne, Ind., who is chairman of the committee, so that a programme can be arranged.

In regard to transportation of the surgeons to Chicago, the way to do is to ask your general manager, who will request the necessary passes over the lines you must travel to get to the meeting. Where companies have chief surgeons this can easily be arranged.

The undersigned committee earnestly desire a large attendance at this, the first national meeting of railway surgeons.

C. B. STEMEN, Chairman,
J. H. TRESSEL, Secretary,
R. L. SWENEY, } Committee.

In the quarterly issue of the Ft. Wayne "Journal of Medical Science" of April, 1888, the following announcement was made:

A NATIONAL ASSOCIATION OF RAILWAY SURGEONS.

The committees appointed by the different associations of the railway surgeons to call a national meeting have decided to call the meeting for the fourth Thursday in June, which will be the 28th, at the city of Chicago. The reason that the committee have named the time on Thursday is that many of the surgeons are in the employ of the Government as pension examiners, who hold their examinations on Wednesdays, so that they could not well be present on Tuesday.

The committee greatly desire that all surgeons who can will attend this meeting, and that medical journals will do us the honor to call attention to it early. A more complete statement of the meeting will be announced by circular to the surgeons.

At the appointed time over 150 railroad surgeons, representing over sixty different railroads, met in the parlors of the Palmer House at Chicago, Ill., and took preliminary measures for the permanent organization of the National Association of Railway Surgeons.

Dr. C. B. Stemen of Ft. Wayne, Ind., called the house to order, and on motion Dr. J. W. Jackson, chief surgeon of the Wabash Western Railroad of Kansas City, Mo., was elected temporary chairman.

At this meeting a committee of fifty was appointed on permanent organization, and reported the following list of officers:

Officers of the National Association of Railway Surgeons (1888), elected at Chicago, Ill.:

President, Dr. J. W. Jackson, Kansas City, Mo.

Vice-Presidents, Dr. J. H. Murphy, St. Paul, Minn.; Dr. J. B. Murdoch, Pittsburg, Pa.; Dr. A. W. Ridenour, Massillon, O.; Dr. L. B. Hovey, Rochester, N. Y.; Dr. J. B. Luckie, Birmingham, Ala.

Secretary, Dr. C. B. Stemen, Ft. Wayne, Ind.

Corresponding Secretary, Dr. E. R. Lewis, Kansas City, Mo.

Assistant Secretary, Dr. J. H. Tressel, Alliance, O.

Treasurer, Dr. R. Harvey Reed, Mansfield, O.

Executive Committee: Dr. W. B. Outten, St. Louis, Mo.; Dr. S. S. Thorne, Toledo, O.; Dr. A. A. Ames, Minneapolis, Minn.; Dr. N. J. Pettijohn, Kansas City, Mo.; Dr. C. B. Higgins, Peru, Ind.; Dr. E. B. Evans, Greencastle, Ind.; Dr. E. J. Ogden, Chicago, Ill.

In addition to taking the preliminary steps for permanent organization, the meeting at Chicago was one of more than ordinary interest from a scientific standpoint, both from the character of the productions and the discussions which followed them, as will be observed by the following list of papers which were read and discussed at the first meeting:

"A Few Points of Railway Surgery," by Dr. W. B. Outten, Chief Surgeon of the Mo. Pac. R. R., St. Louis, Mo.

"Delayed Union and Ununited Fracture; Observations and Reports of Cases," by Solon Marks, Chief Surgeon of C. M. & St. P. R. R., Milwaukee, Wis.

"Two Cases of Successful Simultaneous Triple Amputation for Railway Injuries," by James B. Luckie, Surgeon L. & N. R. R., Birmingham, Ala.

"The First Case of a Brakeman's Injured Fingers and Hands," by Jas. A. Jackson, M. D., Surgeon C. M. & St. P. R. R., Madison, Wis.

"A New Stretcher, Lounge, Operating Table and Fracture Bed," by S. L. McCurdy, Surgeon P. C. & St. L., Dennison, O.

"History of Surgery," by G. W. Thompson, Surgeon "Pan Handle" R. R., Winamac, Ind.

"Synchronous Amputations," by N. C. Lynd, M. D., New York.

"A Case of Simultaneous Triple Amputations with Recovery," by A. J. Banker, M. D., Columbus, Ind.

"First Care and Treatment of Railway Injuries," by H. H. Middelkamp, Surgeon W. W. R. R., Warrenton, Mo.

"Relations of Railway Surgeons and Members of the Bar," by La Grange Severance, Surgeon, C. & A. R. R., Huntington, Ind.

"External Wounds Communicating with Fractures of the Bone," by J. R. Williams, M. D., Kendalville, Ind.

"Report of a Case," by Wm. Calwell, M. D., Ohio.

"Treatment of Compound Fracture," by W. L. Buechner, Surgeon N. Y. L. E. & W. R. R., Youngstown, O.

"Fracture of the Spine with Report of Two Cases," by W. C. Henry, M. D., Indiana.

"Violent Injuries of the Pelvic Bones and Pelvic Viscera," by W. A. McCandles, Div. Sur. Wabash R. R., St. Louis, Mo.

At this meeting a resolution was introduced by Dr. R. Harvey Reed of Mansfield, O., which was passed, making the Ft. Wayne "Journal of Medical Science," a quarterly, edited by Dr. C. B. Stemen, the journal of the National Association of Railway Surgeons, with the understanding that said journal was to be made a monthly and devoted to the interests of the national association, and railway surgery in general.

The annual dues were fixed at \$2.00 a year, \$1.50 of which was to go to Dr. Stemen and 50 cents to the expense account of the association.

It was also decided that anyone who was a regularly appointed surgeon of a railway company was eligible to election in this association and upon the payment of the \$2.00 dues was entitled to membership, and the association journal for one year.

When the association adjourned its first meeting, it adjourned to meet in St. Louis the following year, at a time to be decided upon by the officers and the executive committee.

On the 21st day of December, 1888, the officers of the National Association of Railway Surgeons together with some of the members of the executive committee met in St. Louis and decided to hold the second annual meeting in that city on May 2 and 3, 1889, and appointed Dr. W. B. Outten chairman of the committee of arrangements, which committee consisted of the secretary and treasurer and the following members:

Dr. J. W. Jenkins,

Dr. F. J. Lutz,

Dr. N. B. Carson,

Dr. H. C. Dalton,

Dr. Waldo Briggs,

Dr. W. A. McCandles,

Dr. Robt. Barclay,

Dr. A. F. Steel,

Dr. L. H. Laidley,

Dr. Walter Dorsett.

During the interval between the first and second annual meeting the executive committee drafted a constitution and by-laws for adoption at the St. Louis meeting which was published in the journal of the association prior to the second annual meeting, thus giving each member an opportunity to study its characteristic features and suggest such changes as they might deem for the interest of the association.

The second annual meeting of the association met at the Pickwick Theatre, St. Louis, under the presidency of Dr. J. W. Jackson of Kansas City, Mo., and was a decided success.

The following address by Dr. E. Gregory, Professor of Surgery in the St. Louis Medical College, in behalf of the local profession is short, to the point, and worthy of reproduction.

The doctor said:

Gentlemen of the National Association of Railway Surgeons:

You would scarcely expect one of my age to be a post-surgeon, but I surely had a railway request for this address. The shortest address I ever heard in my life was made by a young man who was courting. He said: "Will you?" and by the time he got that far she answered, "Yes." If there are any ladies present I will say that the story was told by a sour old bachelor.

It is my proud privilege to welcome you and most heartily do I perform this pleasant duty. I feel that I address my pupils. To many of you I have taught the rudiments of anatomy and surgery. Now, after years of faithful work, you return with well-earned reputations, to advance and honor your profession. But a few years ago there was not a railroad in the valley of the Mississippi, and now what do I behold? Hundreds of men representing only the medical interests of our great system of roads, embodying as you do, railroad pull, railroad push, railroad energy, railroad colleges and railroad speed. The marvel of the period, nay, more, the velocity of general surgery is suggestive at this moment of the pertinency of your convention. An old fogey is thankful to God for the invention of the steam brake.

Railroad surgery illustrates the great principles of general surgery. The principles of medicine and surgery are one. All diseases are injuries, all injuries are diseases. The recent advance of medicine has done most for your domain. The splendor of modern surgery comes to wipe away the shame of mutilation, once so humiliating to railway injuries.

The discovery of the causes of inflammation and the methods of prevention have revolutionized medical science. Amputation once the rule is now the exception. Life in a limb is now the guarantee of its preservation. The dread complications of wounds, at once periling life and limb, are now dismissed.

It is a melancholy fact that the mutilations have been transferred to the vital injuries. The shame of the surgery of the physical injuries is now the glory of the surgery of vital injuries, that is, the injuries of micro-organisms. The surgeon who can count the largest number of mutilations most felicitates himself and the injury inflicted is so nice a point that it promises to outrage the census in the near future. Is there no significance in the fact that the mutilations are limited to one sex? Is there no remedy? The bare recital of the deeds of sin and surgery is heartsickening. Cannot the alienists and neurologists succor surgery in this, its great calamity?

I fear this harangue is unprofitable. We must wait till the fashion is past. Meanwhile the appendages must go.

I thank you, Mr. President and gentlemen, for your attention, again welcoming you to our hospitable city, glowing with patriotism, coupled with the hope that your deliberations may be profitable to mankind. [Loud applause.]

Following Dr. Gregory's address Dr. J. H. Murphy of St. Paul, Minn., was called on, who spoke as follows:

Mr. President and Gentlemen:

I do not see my name on the programme for a speech, but I came here to attend this convention of railway surgeons to get together and see what we can do for humanity, and I have never met with one of these associations in which we could not all learn something.

In 1852, when we were but a territory, I was appointed first delegate from Minnesota to St. Louis to attend the meeting of the Medical Association. We had in the association at that time not over 300 or 400 members. Look at it to-day. We shall see this association grow in the same manner, embodying every state in the Union. The American Medical Association has been a great blessing to the human race. We are young. We are starting a new society. This is the second year of the meeting of railway surgeons. The American Medical Association when it started did not start as strong and with as fine prospects for it at that time as we did last year when we met at Chicago.

Here we are at our second meeting with several hundred railroad surgeons

present. I predict that almost every state will be represented here before the meeting has terminated.

What do we meet for?

We have started an association in order to increase the interests of railroad men, to know how and what we can do best for humanity, and I have no doubt that in a few years we will have a mighty society and one which will do a great deal of good for the human race.

When I first attended the American Medical Association there was no necessity for an organization of this kind. At that time we had to go on the Mississippi River. Now the Mississippi has got too slow. The *old society* has got rather slow and we have started a railroad organization that will go with a velocity like lightning.

After reading the programme of the entertainment by Dr. Outten, chairman of the committee of arrangements, the following interesting paper was read and discussed:

"Torsion of Arteries," by Dr. J. B. Murdoch, Pittsburg, Pa., which was discussed by Dr. S. A. Van Mansfield of Nebraska; Dr. Geo. A. Baxter of Chattanooga, Tenn.; Dr. D. S. Robbins, Vicksburg, Miss.; Dr. Good of Birmingham, Ala.; Dr. Pinkney French, Mexico, Mo.; Dr. W. A. McCandles, St. Louis, Mo.; Dr. S. S. Thorne of Toledo, O.; Dr. G. J. Northrup, Marquette, Mich.; Dr. R. Harvey Reed, Mansfield, O.; Dr. H. Nye, Enon Valley, Pa., and Dr. J. H. Murphy, St. Paul, Minn.

After the spirited discussion which followed this important paper Dr. Murdoch closed the discussion and summed up his argument in favor of torsion over the ligature as follows:

1. On account of the greater facility with which it can be done.
2. If the surgeon uses catgut the knot will become untwisted. It becomes softened before the clot has organized, and in that case secondary hemorrhage is likely to occur.
3. With the experience of both Guy's Hospital and the Western Pennsylvania Hospital, it is safer.

This was followed by a paper on "The Hot Springs of Arkansas," by Dr. E. R. Lewis, Kansas City, which was in turn followed by the president's address, by Dr. J. W. Jackson of Kansas City, Mo., on "The Railroad Hospital System of the Mississippi Valley," which was an exhaustive history of the organization and development of the hospital plan for the treatment of the employees and others who may be injured in the service or while traveling over the railroads of our country.

After referring the president's address to the committee on publication the following resolution, offered by Dr. J. G. Thompson of Angola, N. Y., was unanimously adopted:

Resolved, That the suggestions offered by the president in his address in regard to union hospitals be adopted as the sense of this convention and that the president of each railroad be furnished a copy of said address, together with this resolution.

Dr. W. B. Outten of St. Louis contributed a very interesting paper on "A Plea for More Detail in the Treatment of Railway Injuries," which was followed by a paper on "Railway Surgery," by Dr. J. E. Russel of Springfield, O., which was discussed by Dr. H. H. Middelkamp of Warrenton, Mo.; Dr. Alex. W. Atchison, Denison, Tex.; Dr. R. Harvey Reed, Mansfield, O.; Dr. J. H. Bennet, Wauseon, O.; Dr. J. H. Murphy of St. Paul, Minn.; Dr. W. L. Scheneck of Osage City, Kan.; Dr. Mansfield of Ashland, Neb.; Dr. Allen, Liberty, Mo.; Dr. Thorne, Toledo, O.; Dr. Outten, St. Louis, Mo., and Dr. Miller of Lawrenceburg, Ind.



PAST ASSISTANT SECRETARY C. B. POWELL, M. D., ALBIA, IA.

A very practical paper was read by Dr. Robt. Barclay of St. Louis on "The Whistle Signal," in which he set forth a plea for a safer management of railroads. This paper was ordered printed and a copy sent to the general managers of each railroad throughout the country.

Dr. Adolph Alt of St. Louis read a paper entitled "Pterygium Among Railroad Men," which was referred to the committee on publication.

Dr. C. B. Stemen of Ft. Wayne, Ind., presented the following historical memorial regarding the organization of railroad surgeons in this country:

My friends, Drs. Jackson, Outten, Murdoch, Ridenour, and others here, have for a number of years been engaged in the organization and development of accidental surgery as a specialty. In 1882 the first organization of railroad surgeons was effected at Decatur, Ill., on the Wabash system. The meeting was held on the 25th day of January of that year.

At that time I was present and was elected its first secretary and have been honored by holding that position from that time until now. I think I saw at that time, and even before that time, the importance of developing this specialty in this country, that the surgeons might meet and discuss the questions to which you have listened to-day, so as to be better prepared for the great work before us. When I came into the hall this morning and noticed the decorations and saw the large number of surgeons present, I said to some of the surgeons here that I was thrilled, and am glad to think that I had taken part in this work of organizing the surgeons of this country which are in charge of the injured employees and passengers and who are to look after and treat them properly. I rejoice at the attention that has been given to this subject by the surgeons present.

There was a time when medical journals laughed at the idea of forming a railway surgical association. They spoke lightly of it, but I am glad to know that to-day there is something different, for nearly every medical journal in the country published a notice of this meeting and it seems they did it cheerfully. To the men who are gathered here to-day, let me say that the representative men of the profession are engaged in this work.

In the year 1882 the Pennsylvania Company organized its surgeons into a surgical association. This was soon followed by the organization of the Bee Line, the Chicago & Atlantic, and many other organizations which were perfected in this country, until to-day we have succeeded in organizing a national association. I rejoice to-night at the prospect of this organization becoming one of the greatest surgical associations in the world. I do not believe there is anything equal to it now, and if the surgeons of the railways and general managers do their duty (and we have received quite a number of communications from the latter in which they express hearty accord with the purpose of the meeting and a willingness to do all within their power to further the success of the undertaking, as you will hear read to-morrow by the corresponding secretary) there will be an influence brought to bear upon this association that will revolutionize the work in caring for the injured and sick. A grand and glorious future awaits us.

Through the courtesy of the general manager of the Wabash system I was permitted to travel through Europe and to investigate the methods employed by foreign railway companies in taking care of their sick and injured men. I was permitted to visit all the headquarters of the railroads in England, Scotland, Ireland, France, Switzerland, Austria, Germany and Belgium, and I found there that while they were not organized they were preparing and taking care of their injured men, in a great measure, in accordance with the plan of the Missouri Pacific, the Wabash and other railroads who have adopted the hospital plan. I believe the time is not far distant, if the surgeons will stand united through this organization, if they work as they should work, when there will be a wonderful revolution wrought in caring for the injured men and those who are moving our trains. Let us remember that nearly one-fifth of the American population are on wheels and are in danger, though I am glad to say that under the present good management of our systems we have few collisions and few wrecks. But we do have them when we least expect them.

It is true that such an organization as this will bring about this revolution, and as I have before remarked, I am proud to think that I ever had an interest in the work of these organizations and I trust every surgeon will go home from this association determined to talk with his general manager and superintendent, and

through our publication sent to them we will get their co-operation, and when they understand the matter thoroughly they will provide for the proper care of their injured.

Following Dr. Stemen's historical remarks, Dr. Mansfield of Ashland, Neb., added that he desired to state that there had been a society of railroad surgeons organized in the state of Nebraska since 1884, and that the surgeons of all the roads and their smaller branches were members of it. The society meets three times a year, and the papers read are of a high order.

This was followed by Dr. G. P. Conn of Concord, N. H., who said he had been interested in the remarks of the secretary in regard to the organization of railroad surgeons. It was a thing to which very little attention had been paid. There should be a mutual relationship existing between the surgeons and general managers of railroads.

In this connection he was very much interested in an article he had read a few weeks ago in the "North American Review" by Charles Francis Adams, wherein he maintained that if railway managers would take better care of employees strikes would be undoubtedly averted. Personally he believed this to be true. If such managers throughout the country provided for their employees when they became sick, maimed or disabled, by perfecting a system whereby they could be pensioned off, the same as soldiers in the army, it would be a blessing to the country at large, and he believed we would have fewer strikes to contend with.

Following Dr. Conn, Dr. Outten said the Eastern Railway of France had devised a plan whereby they purchased the clothing of the railroad employes, supplied them with coal at a given rate, and gave their children passes to and from school if desired. In the event of an employe being killed and his wife desired employment she would get it. They also had a pension bureau and by and through this means every individual was pensioned who was unable to work. He might add that there were no less than half a dozen such men in the city of St. Louis to-day receiving pensions regularly from France.

Dr. Outten then spoke of the benefits accruing to employes of railroads from the hospital system, as carried out by the Missouri Pacific. He referred to the growth of these institutions and how they had grown into popular favor with all employes on the railroads. He explained the methods adopted in carrying out the plan which was originally adopted, and how from bitter opposition at first the feeling had grown into one of interest and sympathy on the part of the various systems now in operation on the Missouri Pacific and Wabash railroads, and stated that the hospitals of these companies had been economically built, and were being scientifically and frugally managed.

In continuing the same general discussion the corresponding secretary read a few of the letters he had received from the general managers of the railroads pertaining to the organization, the tenor of which was very flattering to the association. These letters after some debate were ordered placed on file for future reference.

A paper was read on the subject of "Railway Stretchers," by Dr. Alex. W. Atchison of Denison, Tex., which was referred to the committee on publication and discussed by Dr. Mansfield, Ashland, Neb.; Dr. W. B. Outten of St. Louis, Mo.; Dr. A. W. Ridenour of Massillon, O., and Dr. W. P. King of Kansas City, Mo.

This discussion was followed by a paper by Dr. John F. Fulton of St. Paul, Minn., on "Railroad Injuries to the Eyes," which was referred to the committee on publication.

Dr. R. Harvey Reed of Mansfield, O., contributed a paper on the "Clinical Observations on Some of the Effects of Direct and Indirect Traumatism of the Brain," which was referred to the committee on publication without discussion.

The following papers were read by title and were referred to the committee on publication, "Sanitary Inspection of Railways," by Dr. C. M. Riley of St. Louis, Mo.

"Diseases Existing Prior to Railway Injuries; Their Relation and Reliability to Railroad Companies," was the title of a paper read by Dr. Chas. H. McIntyre, New Albany, Ind.

At this meeting the executive committee presented a constitution and order of business, which, with a few minor changes, was adopted and read as follows:

ARTICLE I.

NAME.

The name of this Association shall be called "The National Association of Railway Surgeons."

ARTICLE II.

PURPOSE.

The object of this Association shall be to promote acquaintance and fraternal relations among railway surgeons; to secure interchange of ideas and the adoption of the best methods for the development and improvement of railway surgery, and to establish it as a special branch of the chirurgical art.

ARTICLE III.

MEMBERS.

The members of this Association shall be surgeons to railway companies; provided, however, that when a surgeon is once a member his retirement from the service of the company shall not forfeit his membership.

ARTICLE IV.

OFFICERS.

The officers shall consist of a President, seven Vice-Presidents, and a Recording, Corresponding and Assistant Secretary, a Treasurer, and an Executive Committee of seven, who shall serve until their successors are elected, which shall be, four on even years and three on odd years; those holding over the first year shall be decided by lot, afterward by service.

ARTICLE V.

DUTIES OF OFFICERS.

The President shall preside at all regular and called meetings.

In the absence of the President, the Vice-Presidents shall perform the duties of their office in the order of their election. The Recording Secretary shall keep a record of the proceedings of all meetings and collect all dues, paying them over to the Treasurer, taking his receipt therefor; and draw all orders on the Treasurer for the payment of bills. The Corresponding Secretary shall attend to all correspondence pertaining to the business of the Association, and notify all members of the meeting and assist the Recording Secretary at the meetings.

The Treasurer shall give bond to faithfully account for all funds coming into his possession belonging to the Association. The amount of the bond to be determined by the Executive Committee.

ARTICLE VI.

ELECTION OF OFFICERS.

The election of officers shall be by ballot at the annual meeting and they shall assume their duties immediately before the adjournment of the annual session.

ARTICLE VII.

COMMITTEE ON PUBLICATION.

The Committee on Publication shall be appointed by the President, immediately after the latter has taken his seat.

ARTICLE VIII.

SECTION 1. The action of the officers and the Executive Committee combined shall be deemed the action of the Association when the latter is out of session.

SEC. 2. The Executive Committee shall fix the annual dues and membership fee and act as a Committee on Credentials, and audit all accounts.

ARTICLE IX.

MEETING.

SECTION 1. The regular meeting of the Association shall be held the first Thursday in May of each year, at the place determined by the Association, and the session to continue for not less than two days.

SEC. 2. Special meetings shall be called by the President, at the written request of the officers and the Executive Committee; but the business to be considered must be specified in the notification to be sent to each member of the Association.

ARTICLE X.

Members present shall constitute a quorum at all meetings, and a majority vote decides all questions.

ARTICLE XI.

In their deliberations the Association shall be governed by "Cushing's Manual."

ARTICLE XII.

Amendments to this Constitution may be offered at any regular meeting and acted upon at the next, but to amend, a two-thirds vote in the affirmative by those present shall be required.

At this meeting the following officers were elected for 1889 and 1890, after which the association adjourned to meet in Kansas City the first Thursday in May, 1890.

Officers of the National Association of Railway Surgeons (1889) elected at St. Louis, Mo.:

President, Dr. J. B. Murdoch, Pittsburg, Pa.

Vice-presidents, Dr. W. B. Outten, St. Louis, Mo.; Dr. W. H. Elliott, Savannah, Ga.; Dr. W. B. Rogers, Memphis, Tenn.; Dr. J. F. Pritchard, Manitowoc, Wis.; Dr. G. P. Conn, Concord, N. H.; Dr. T. P. Livingston, Plattsburgh, Neb.; Dr. F. J. Bancroft, Denver, Col.

Recording Secretary, Dr. C. B. Stemen, Ft. Wayne, Ind.

Corresponding Secretary, Dr. E. R. Lewis, Kansas City, Mo.

Assistant Secretary, Dr. A. G. Gumaer, Buffalo, N. Y.

Treasurer, Dr. R. Harvey Reed, Mansfield, O.

Executive Committee: Dr. S. S. Thorne, Toledo, O.; Dr. C. B. Higgins, Peru, Ind.; Dr. E. N. Small, Sedalia, Mo.; Dr. A. A. Ames, Minneapolis, Minn.; Dr. N. J. Pettijohn, Kansas City, Mo.; Dr. E. B. Evans, Greencastle, Ind.; Dr. E. J. Ogden, Chicago, Ill.

There were over 500 surgeons present at the St. Louis meeting from all parts of the country. The arrangements of the local committee were all that could be desired, which was evidenced by the numerous expressions of delight in the manner in which they were treated by the committee from the members on all sides.

Dr. Outten, the chairman of the committee, spared neither time nor means in making the meeting one which would long be remembered by the association so far as the entertainment of members was concerned. He had secured a commodious hall for the meeting, which was decorated for the occasion, and furnished the members with beautiful badges, on which was a unique design of two driving wheels of an engine carrying Mercury's Caduceus, all of which was furnished the association free of expense. He had a committee stationed at the Union Depot to

give the surgeons all the explanations and directions required as to hotels, place of meeting, etc.

The character of the scientific work done at this meeting, while not what it might have been, was all that could have been expected from a young organization which had just been launched out on a new, and, to a great extent, unexplored sea. The meeting demonstrated to all present the importance of maintaining a national association of railway surgeons and the vast field for cultivation which lay before it.

The third annual meeting of the National Association of Railway Surgeons was held at Kansas City, Mo., May 1, 2 and 3, 1890, in Gillis Opera House, and was called to order at 10 A. M. by the president, Dr. J. B. Murdoch of Pittsburg, Pa., after which prayer was offered by Rev. T. E. Vasser, when a short address of welcome was offered by Mayor Holmes of that city, in response to which President Murdoch spoke as follows:

Mr. Mayor:

In behalf of the members of this association I have been instructed to respond to the address of welcome which you have just given. We thank the citizens of Kansas City for this generous welcome to the hospitalities of their city.

This meeting, sir, was called at Kansas City for many reasons, partly because of its central location, on account of the numerous railroads which center here, rendering it easy of access from all parts of the nation; partly because of the numerous surgeons of prominence who hold positions upon these railroads and partly because of the well-known enterprise and hospitality of the citizens of Kansas City. These are some of the reasons why we are here to-day, and it is because, sir, that at the last meeting of this association at St. Louis we were invited to come here by our late lamented, beloved president, Dr. Jackson.

That he is not here to-day to welcome us, together with the thought which presses home upon the minds of us that we will never be able to look upon his manly face again, casts a gloom over this meeting which cannot be shaken off. But we know, sir, that though he is dead he yet speaketh to us, and if the spirits of the departed are permitted to revisit the scenes of their earthly labors and mingle with those whom they loved while here on earth, we believe that the spirit of our beloved president is with us now and he is saying to us, as you have already said, "Welcome, gentlemen of the National Association of Railway Surgeons, to Kansas City." We feel, therefore, sir, that we have a double welcome—the one which you have addressed to us and the one which speaks to our souls and bids us welcome. But we must not let this feeling of sorrow too much oppress us. We have work to do and yet we deem it proper to pause for a moment in our labors to lament for the past. I will therefore detain you no longer in this response to your address of welcome, but will simply say again, sir, in behalf of the National Association of Railway Surgeons, we thank you for the generous welcome which you have extended to us.

This was followed by an address of welcome in behalf of the Jackson County Medical Society by Dr. John Wilson of Kansas City, Mo., who said:

Mr. President and Gentlemen of the National Association of Railway Surgeons:

The duty has devolved upon me, in behalf of the Jackson County Medical Society, to extend to your association and to each and every member personally, a broad and cordial welcome. In reaching out to you the hand of professional fellowship, filled with professional and brotherly regard, it seems but a consummation of the fitness of things that this, our city, proud in its boastful prosperity, should have the pleasure, the opportunity and the honor of welcoming to our midst the representatives, in any branch of the service, of that peculiar enterprise that has been so potent a factor in the upbuilding of what but a few years since was a village, now a great city, her factories, machine shops and huge merchandise depots facing on every side, while high above all towers her tall smoke stacks, sending forth their black volumes of trade increase toward heaven.

Kansas City, gentlemen, situated equi-distant between the two great water bodies of the world on the east and west, the sun-kissed valleys of the South and the rich timbered hills and green-laden fields of the North, stands the common

center to which has rallied from every point of the compass much of the most vigorous, richest and best blood of the land. Our fair city can, without undue egotism, claim to be the common home and adopted mother of brawn and brain from every clime, bringing with them the characteristics of push and enterprise that have, in an incredibly short space of time, thrown her far to the front; here you may find an exemplification of the theory of the "survival of the fittest," for he who would not be left behind in the race cannot afford to sleep. The result of this admixture in the social and business intercourse existing between these strong, active and self-reliant natures thus thrown together has been a development and widening of the better sentiments and higher elements of manhood, as well as broadening the scope of intellectual capacity. Generosity and hospitality mark the private, as does activity and public spirit mark the public life of our people. Gentlemen, you will pardon a just pride when I say that Kansas City is neither deaf to the call of distress nor found wanting in the pleasing task of dispensing her hospitality. As an integral part of this citizenship, we, her medical men, would fain reflect her virtues, and in this instance be her almoner.

To you, gentlemen, representing that arm of the service whose duty it is to stand between life and death, drawing back the dark shadow with the mailed hand of scientific acumen, or failing, to soothe with the tenderness of a woman, we give greeting. In the name of the profession of this city and county, that hospitality I extend to you.

There is yet another cord that draws us toward you and enlivens the feeling of amity that by the bonds of a common interest in the medical sciences should exist between us. It is an admiration and wonder that this association should have assumed such magnificent proportions, when not yet a half decade marks the milestones of its existence.

Gentlemen, your association stands unrivaled in the history of medical bodies; with but a few years since no existence, to-day you stand full-panoplied in the strength and armor of this splendid showing of physical and mental membership; an evidence that you have caught the spirit of that grand achievement of the nineteenth century, transportation by rail; and that, like that great scheme (one arm of which you represent) you move toward the consummation of your undertakings, not by the slow progress of plodders, but with unified strength; every part of the machinery in motion, with the utmost nicety adjusted, you spring forward with a rapidity unparalleled in the experience of the past.

In the morning of your existence, yet with the strength of manhood, your success proves that they who originated the idea and inaugurated the plan, builded wisely, and most happily seized the auspicious time when surrounding circumstances were ripe and the data ready for inception of this great work, claiming a community of interest in all that pertains or redounds to the credit and glory of the medical men on this side of the great waters. I feel a justifiable pride that the movement was conceived on the American continent. It further shows the progress of the medical sciences; that the profession is progressive, abreast of the times and responsive to the demands of the day. The fast moving wheels of this complex age made manifest this want.

Your presence here to-day demonstrates how swiftly and satisfactorily this want has been supplied. The multiplicity of detail and the vastness of the ramifications of railway extensions indicate the extent of the work and the character of the ability necessary to carry to a successful issue that work. The perfection of your organization and the records of your association show how well the profession has met the emergency and surmounted all difficulties.

When I consider that this is but your third annual meeting, and view the disparity existing in the age of your association and the magnitude of your assembly and work accomplished, I cannot but give vent to the expression that the inception of your organization marks an epoch in the annals of medicine and surgery; one that will go on and on in its influence until its impress will be indelibly stamped upon the print and practice of the day and age; that it will be on the side of a safe and sound conservatism, however bold will be the mold in which it is cast, arising from the emergencies in which your peculiar field of duty may so often place you. I have no fear—and again am I reassured—when I see on your roster men whose names I will not call, yet names not unknown to fame and already familiar in the soundest surgical literature of the day.

Running parallel with nature's laws is the law of compensation. The demands of the advanced civilization of the age, its mercantile, intermaterial, social and

other interests, coupled with the rapidly developing resources of this widespread country in all its variations and possibilities, has stimulated capital, brain and energy to push enterprise to an extent unknown outside this century; one of the results of which has been to cross and recross this continent with a network of countless lines of rail, giving rise to the immense systems that you are here to represent in your special service. While the compensation has been great to the varied industries that have sprung into existence in their wake, other needs have brought a compensation to the science of medicine and surgery by opening a new field calling for a character of work and manipulation differing in many particulars from the ordinary routine of the current practice and medical literature of the day; and, while compensation is the common heritage of the universal brotherhood, yet to your association belongs the privilege of occupying the field, and to your original projectors the honor of conceiving the plan. In the opportunities thus afforded you lies concealed and undeveloped much that would enrich the pages of scientific literature, and carry the name of your body to an enviable position in surgical history. That you will not fail to avail yourselves of this opportunity the promise of this meeting attests.

Gentlemen, yours is a grand body, and the objects of your organization are grand, the immensity of either of which can only be measured and appreciated by a contemplation of the wide extent of the countries you represent, coming from almost every railway system in the Canadas, America and the land of the Montezumas; you came not in the weakness of the struggling handful, but in the strength of a trained legion. Every rail that lays its straight and continuous course toward our city for miles, reaching into the thousands in every direction, has felt the tread of the carriage bearing you to this goal, and every forest, hill and plain of this great country has heard the music of the open-throated locomotive as it sped onward with lightning rapidity toward this distant center. You meet here to-day, gentlemen, to take up again the pursuit of your labors and to renew the social ties, the ends of which have loosely hung for the past year, with refreshed vigor, and many new and interesting ideas and propositions drawn from and suggested by the experience and studies of the year gone by. You doubtless anticipate a most pleasant and profitable convention, one that will not only enable you to render better and more fruitful aid in your special field of work and the cause of humanity, but will also reflect additional luster on the pages of surgical science as contributed by the railway surgeons on this side the great Atlantic. That you may meet the fruition of your fondest wishes and the realization of your most ardent desires it is my province in behalf of those for whom I speak to cast a fervent hope; and further, in the meetings to follow in the years to come, when amid other scenes and surrounded by the presence of other influences, you continue to weave the web of yet more perfect work, accept the hope of your speaker that you will look back in pleasing retrospect and dwell upon this, your convention of the year 1890, as one of the brightest pages in the history of your organization.

My friends, my task is about completed and this most pleasing duty of extending to you this salutation of welcome about ended. Before I close I take another look into your faces that I may the better remember you in the future. I see here and there familiar faces, some that were younger when I was younger, but I miss one well-known face, one that was of your number and of our number when last you met. You doubtless already anticipate of whom I speak and I feel, gentlemen, that it is but meet in this address of welcome that I mention his name, for were he here to meet you your welcome would not be one of empty words. The name—John W. Jackson. That is no strange name to you. You all knew him. You knew what he was to your association. We knew him. We know what he was to his friends at home. In an evil day the destroyer came, the "golden bowl was broken, the silver cord was loosed," and the immortal part of the man about whom so many friends clustered winged its flight to the God who gave it. Friends came and with tender hands raised his body and gently laid it away, six feet due east and west in beautiful Elmwood, embalmed in flowers and watered by the tears of affection. But his spirit still lives and to-day looks down unseen upon this hour and joins me in again extending a cordial and unstinted welcome to that association for which he labored so well and to whose indomitable perseverance it owes so much.

Once more, gentlemen, in the name of those for whom I speak I give you a welcome to our hearts and homes.

Dr. J. H. Duncan, chairman of the committee of arrangements, presented

his report. With regard to the matter of a banquet, he said the committee had thought over the matter carefully. Men were consulted even outside of the committee and taking everything into consideration it was decided that this body being in its infancy, having a membership of upward of 600, that banquets, entertainments and things of that character detract from work. The association met for work and not for play.

The regular routine of business was then taken up and letters read by the corresponding secretary from various railroad managers wishing for the success of the meeting, also from the members of the association who were unable to be present. On closing his report he recommended that a committee be appointed to draft suitable resolutions on the death of Dr. John W. Jackson, the first president of the association. After considerable discussion over various points brought out by the report of the corresponding secretary the report of the executive committee was called for, which was as follows:

The executive committee respectfully submit the following report and recommendations:

It is recommended that cities desiring to entertain the association in 1891 shall present their names to the secretary, who shall refer them to the nominating committee.

The committee suggest a change in the constitution as follows: Article V be made to read: "The Treasurer shall collect all dues and account for the same, keep a correct list of members and report it to the secretary within two weeks after each annual meeting. He shall pay out funds only upon orders of the Association when signed by the Recording Secretary and the President. He shall give bond to faithfully account for all funds belonging to the Association which may be placed in his hands. The character of the bond to be determined by the Executive Committee."

We would suggest a change in Article VII so that it may read: "A Committee on Publication, consisting of five members, shall be appointed by the President immediately after he shall have assumed the duties of his office. The duties of this committee shall be to determine by whom and in what form the transactions and the papers of the Association shall be published."

We further recommend that the dues for the current year be fixed at \$2.

In accordance with the provisions of the constitution it was decided by lot that Drs. N. J. Pettijohn, A. A. Ames, W. B. Outten and S. S. Thorne serve for a short term as members of the executive committee and Drs. E. B. Evans, E. J. Ogden and C. B. Higgins for the long term.

It will therefore be necessary to elect four new members of the executive committee at this meeting.

S. S. THORNE,	} Committee.
N. J. PETTIJOHN,	
C. B. HIGGINS,	

The report of the executive committee brought out considerable discussion which was finally ended by setting a special time for its discussion and disposal.

Dr. G. P. Conn of Concord, N. Y., read a valuable paper entitled "Railway Hygiene," which was discussed by Dr. W. B. Outten, who showed from actual experience how systematically and perfectly such work could be carried out under a properly organized surgical department with little or no expense to the company and with great gain to the employes and passengers. Dr. Conn's paper was referred to the committee on publication and the doctor extended a vote of thanks for the same.

Dr. J. H. Thompson of Kansas City, Mo., read a paper on the "Abuse of Tobacco and Alcohol a Cause of Acquired Color Blindness."

A paper entitled "A Report of Fatal Injury to the Cervical Region of the Spine" was read by Dr. T. J. Whitten of Nokomis, Ill.

Dr. J. F. Pritchard of Manitowoc, Wis., not being present, his paper on "The

Relations of the Railroad Company to the Surgeons" was read by the corresponding secretary, Dr. E. R. Lewis. The discussion on this paper was opened by Dr. Wm. A. McCullen, Independence, Kan., and was participated in by Dr. A. A. Garnett, Colorado Springs, Colo.; Dr. Geo. J. Northrop of Michigan; Dr. J. M. Allen of Liberty, Mo.; Dr. J. H. McIntyre, St. Louis, Mo.; Dr. T. W. Beard, Vincennes, Ind.; Dr. J. M. Weaver, Dayton, O.; Dr. W. P. King, Kansas City, Mo.; Dr. W. H. Bennett of Wauseon, O.

The president filled the vacancy on the committee of publication caused by the death of Dr. Jackson by appointing Dr. W. B. Outten of St. Louis, and all papers read before the association were referred to this committee except when the association ordered otherwise.

The evening session of the first day was set apart to the memory of Dr. J. W. Jackson, in honor of which Dr. H. A. Middelkamp of Warrenton, Mo., delivered an appropriate eulogy, which was followed by Dr. E. R. Lewis of Kansas City, Mo., with an address entitled "Our Dead."

The time having come for the consideration of the report of the executive committee, the minutes of the second annual meeting were first read, which elicited considerable discussion relative to their correctness, which was participated in by Drs. Northrop, Thorne, Stemen and others. They were finally approved as read.

A lengthy debate was had on the report of the executive committee, which was participated in by Drs. Northrop, Stemen, Thorne, Phillips, Cole, Murphy, Nye, Ridenour, Holland, Rogers, Tressel and others.

The bone of contention in this discussion seemed to be in the question as to whether the association desired to continue the journal of the national association or not. Being nearly equally divided on this subject a compromise was effected allowing those who desired to take the journal to do so at \$3 a year including their dues and those who did not desire to take the journal for the coming year were allowed to pay \$1 dues and omit the journal.

At the morning session of the second day the president, Dr. J. B. Murdoch of Pittsburg, Pa., delivered his annual address, which on motion of Dr. Murphy was referred to the committee on publication.

It was also decided that a committee be appointed to act on the suggestion recommended by the president, Dr. Murdoch, in his paper, which was carried and the president given power to appoint said committee.

Dr. J. H. McIntyre of St. Louis, Mo., read a paper on "Trephining the Cranium" with report of cases.

After which the president announced the nominating committee, which consisted of the following members:

Chairman, Dr. E. R. Lewis, Kansas City, Mo.; Dr. W. J. Peck, Davenport, Ia.; Dr. W. B. Rogers, Memphis, Tenn.; Dr. Geo. Young, Evansville, Ind.; Dr. W. B. Morehouse, Danville, Ill.; Dr. W. B. Outten, St. Louis, Mo.; Dr. J. H. McIntyre, St. Louis, Mo.; Dr. J. H. Murphy, St. Paul, Minn.; Dr. A. H. Garnett, Colorado Springs, Colo.; Dr. J. B. Murdoch, Pittsburg, Pa.; Dr. J. W. O'Connor, Denver, Colo.; secretary, Dr. C. K. Cole, Helena, Mont.

Dr. W. B. Rogers of Memphis, Tenn., read a paper entitled "Two Pirogoffs Amputations," which was discussed by Drs. W. L. Buechner, Youngstown, O.; W. P. King, Kansas City, Mo., and B. F. Wilson, Slater, Mo.

A paper on "Amputations with Reference to the Adaptation of Artificial Limbs" was read by Dr. A. W. Garnett, Colorado Springs, Colo., which was followed by a contribution by Chas. Truax of Chicago, Ill., entitled "Amputation from the Standpoint of an Instrument Maker."

Dr. W. H. Elliott of Savannah, Ga., read a paper on "Plaster of Paris in Recent Fractures."

Dr. W. L. Buechner, Youngstown, O., read a paper on "Compound Fractures and Their Treatment," after which the association was entertained by a poem from Dr. G. M. Dewey, Keytesville, Mo., on "A Few Lines on Antiseptics."

"The Company Surgeon and the Traveling Public" was the subject of a paper read by Dr. A. W. Ridenour of Massillon, O.

Dr. LaGrange Severance of Huntington, Ind., read a paper entitled "Relations of the Railway Surgeon to the Company."

Selina, Kan., was represented by Dr. W. A. Phillips, who contributed a paper on the "Local Surgeon, His Status and Emoluments."

These papers were discussed by Dr. W. L. Schenck of Osage City, Kan.; Dr. Allen, Liberty, Mo.; Dr. Phillips, Selina, Kan.; Dr. Dickson of Ohio; Dr. D. H. Fitzgerald, Wetmore, Kan., and Dr. C. B. Stemen, Ft. Wayne, Ind.

At the evening session the nominating committee reported the following list of officers for the year 1890-91:

Officers of the National Association of Railway Surgeons (1890) elected at Kansas City, Mo.:

President, Dr. W. B. Outten, St. Louis, Mo.

Vice-Presidents, Dr. S. S. Thorne, Toledo, O.; Dr. John J. Buckley, Missoula, Mont.; Dr. G. P. Conn, Concord, N. H.; Dr. R. S. Toombs, Greenville, Miss.; Dr. W. J. Galbraith, Omaha, Neb.; Dr. N. J. Pettijohn, Kansas City, Mo.; Dr. Wm. H. Elliott, Savannah, Ga.

Secretary, Dr. E. R. Lewis, Kansas City, Mo.

Corresponding Secretary, Dr. A. G. Gumaer, Buffalo, N. Y.

Assistant Secretary, Dr. C. B. Powell, Albia, Ia.

Treasurer, Dr. R. Harvey Reed, Mansfield, O.

Executive Committee: Dr. C. K. Cole, Helena, Mont.; Dr. A. A. Ames, Minneapolis, Minn.; Dr. B. F. Wilson, Slater, Mo.; Dr. J. M. Dinnen, Ft. Wayne, Ind.; Dr. D. J. Holland, Atchison, Kan.

On motion of Dr. Lewis, Chief Surgeon Outten of the Missouri Pacific Railroad was requested to read a statistical paper referring to the surgical service of the said road, before which a vote of thanks was tendered the various railroads for furnishing transportation, which was also extended to the committee of arrangements, who had so hospitably arranged for the entertainment of the association while in Kansas City, which was seconded and carried unanimously.

This was followed by a general discussion of "The Hospital Plan," which was opened by Dr. Stemen of Ft. Wayne, who was followed by Dr. W. P. King of Kansas City, Mo.; Dr. Murphy of St. Paul, Minn.; Dr. Lewis, Kansas City, Mo.; Dr. Gumaer of Buffalo, N. Y., and Dr. Holland of Atchison, Kan.

In this discussion it was shown that for a very small assessment on each employe all the injured and sick could be cared for at a commodious hospital owned and controlled by the company, under the management of skilled and competent surgeons and nurses, which was shown to have become very popular among the employes, especially of the Missouri Pacific and Wabash railroads.

At the morning session of the third day, after the reading of the minutes of the previous session by the secretary, the treasurer's report was made in the absence of the latter by the secretary and was referred to the executive committee for examination.

It was also decided to appoint a committee to revise the constitution and by-laws and report at the Buffalo meeting.

The president, Dr. Outtch, appointed the following committee for that purpose: Drs. C. K. Cole, E. R. Lewis, C. B. Stemen, R. Harvey Reed, J. B. Murdoch and A. W. Ridenour, and on motion the president himself was also made a member of the committee. The president also appointed as a committee of publication Drs. Stemen, Lewis and Higgins, after which the association adjourned to meet at Buffalo, N. Y., in May, 1891.

It seems useless to add that the third annual meeting of the National Association of Railway Surgeons was a success in every respect and that the interest in the object for which the association was organized was becoming widespread and the importance of the association was being felt more and more as its true merits were developed from year to year at the annual meetings. The surgeons met at Kansas City expecting a good meeting, but their anticipations were far excelled by the reality. The committee on arrangements had provided everything for the comfort of the members of the association without money and without price and everyone present went away feeling that the committee had done its work generously and well.

A large number of new members registered in addition to the majority of old members who were in attendance and contributed to the scientific work of the association.

Perhaps never before was such a meeting held in this country. It was undoubtedly the largest gathering of representative railway surgeons that had ever assembled at one time and place in the history of the world, and especially was the number of delegates from the South and West exceptionally large. This was, of course, accounted for from the fact that the meeting was held in their own territory, as it were; and besides, the railways of these sections of the country have a more complete system of surgical service than those elsewhere, which accounts to a large extent for the interest taken by the surgeons, not only in their own advancement, but in the welfare of the roads they represent.

We believe that this meeting was an incentive to the other sections of the country, and especially the East, to consider the adoption of better organized surgical services, especially on the old trunk line roads.

In this brief history of the growth and development of the National Association of Railway Surgeons we have only endeavored to give a few of the main facts connected with its birth and development. We have not gone into details nor attempted to produce the papers or discussions which they developed at the various meetings.

This alone would form an interesting volume of itself, but we feel that a historical sketch of this character should be made and kept as a part of the archives of the association, in a concise form, as we have tried to make it.

But we cannot successfully close this historical sketch without referring to the departed.

Although we are young in years many of our members who took part in the organization of this association have passed beyond the River and it is but just to their memory and to the work they accomplished in the interest of this organization that their names be recorded on the historical tablets of the same.

In this connection we feel that we are justified in giving space to the memory of our first president, Dr. J. W. Jackson, who was beloved by all who knew him, either socially, professionally or in any of the relations of life. A loving husband, a kind father, and an affectionate and loving son. Those who had the pleasure of visiting the home of this noble man found it to be a paradise, where love and affection were the ruling principles. No better evidence of the goodness of Dr.

Jackson could be desired than that loving devotion which he had for his aged mother, which is one of the best evidences of a good man. He was not only a leading physician and surgeon of Kansas City but one of the leading men in the profession in the United States. Dr. Jackson was fifty-five years of age and had been a resident of Kansas City for six years. The disease which caused his death was contracted while performing an operation, which while it saved the life of his patient cost him his own. He contracted blood poisoning, the first evidence of which was observed in the right arm. The progress of the disease was slow but sure. He went to Hot Springs, Ark., where he remained a month, after which he returned home much improved but still not well and with no intention of resuming practice for a while. He was induced, however, to perform an operation for an old patient, and, while attending her, an embolus formed in his left arm and was carried to the lungs, causing embolic pneumonia, with which he lay for a month. He was beginning to recover from this when a trombus formed in the right leg, completely cutting off the circulation and again putting his life in jeopardy. He rallied again, and ten days before his death a second trombus formed in his brain, but the danger from this was only temporary. He was doing well and apparently in a fair way to recovery when a third trombus formed, this time in the left leg, from the effects of which he never recovered, sinking gradually until death relieved him, March 13, 1890.

Dr. Jackson left a wife and two sons, Jabez N. Jackson and Walter A. Jackson, aged respectively twenty-one and nineteen years. Three brothers also survive him of whom Dr. J. F. Jackson is a prominent physician of Kansas City; Thomas B. Jackson lives in Horton, Kan., and Richard L. Jackson in Canada. A sister, Mrs. C. S. Armstrong, lives at Mound City, Mo.

As a surgeon Dr. Jackson had achieved a national reputation, and was cut off just as he had begun to really enjoy the well-earned reward of years of application and hard work. As a man he counted his friends by thousands while enemies he had but few. He was president of the Kansas City Medical College and first vice-president of the American Medical Association, the highest honor that can be conferred upon a physician except the presidency, and *that* would have been his had he lived another year. He was a Mason and was also a member of the Order of Elks.

In sketching the business life of this eminent physician and universally esteemed citizen it is no disparagement to the many others equally skilled in their profession to say that he stood at the head. Dr. John Wesley Jackson was born on the 6th of November, 1834, in Clark County, Md. He received a thorough common school education in his boyhood days, which was supplemented by a regular course at the Charleston University, West Virginia. In 1859 he migrated to Franklin County Mo., and in the same year commenced the study of medicine with Drs. George Johnson and J. L. Matthews. In 1863 he graduated in medicine at the St. Louis Medical College, and immediately located in Labadie, Mo., where he practiced his profession with marked success until the spring of 1864, when he entered the United States Army as surgeon of the Forty-eighth Missouri Volunteers. He remained in the army until the close of the war, during the last year being post-surgeon at Columbia, Tenn. At the close of the war he located in St. Louis, where he remained until 1869 when he returned to Labadie and resumed practice there. In that year he was united in marriage to Miss Jennie C. North, a beautiful and accomplished young lady of Labadie. Although now one of the most skillful and successful physicians in the West, with a lucrative practice, he was

not yet satisfied, so in 1873 he visited the College of Physicians and Surgeons in New York City from which he graduated with honor in the following year.

Upon his return to Missouri, in 1874, he was appointed chief surgeon of the Missouri Pacific Railroad and built up the first railway hospital system ever established east of the Rocky Mountains.

In 1879 he built the first hospital on the Missouri Pacific Railroad at Washington, Mo., which he operated until 1881 when his jurisdiction was enlarged so as to embrace the Missouri, Kansas & Texas Railroad, when the hospital was removed from Washington to Sedalia. In the spring of 1883 his jurisdiction was again enlarged so as to take in the entire Gould system, except the Iron Mountain division, and in 1884 the entire Wabash system west of the Mississippi was placed in his charge. In February, 1885, he resigned his position with the Missouri Pacific and assumed entire charge of the Wabash system. Dr. Jackson was chosen to the chair of surgery in the Kansas City Medical College in 1880, but did not remove to Kansas City until 1883.

In 1888 he was elected the first president of the National Association of Railway Surgeons at its organization in Chicago, Ill.

Although our association sustained a very great loss in the death of Dr. Jackson, its first president, yet in the death of Dr. A. W. Ridenour of Massillon, O., one of its first vice-presidents, it has sustained a loss almost equal to that of Dr. Jackson. While Dr. Jackson served as the first president of our association Dr. Ridenour was the projector of the National Association of Railway Surgeons. It was he who first conceived the idea of such an association and he who introduced the first resolution, the fulfillment of which resulted in the organization of this association a few months later. Dr. Ridenour was a man of more than ordinary ability and had long since gained the distinction of being not only a skillful but a successful surgeon.

His reputation as a writer had reached far beyond the boundary of his adopted state and his productions were eagerly sought by the profession. He was active and energetic to the very last. Indeed, we may truly say that "he died in the harness." The night he was stricken with paralysis he had just returned from counsel with a brother practitioner. On his table was found his last paper on "A Case of Real Spinal Injury," finished and addressed to the writer of this for publication in the "Railway Age."

In his death our association lost not only its father, so to speak, but a warm friend and a valuable contributor to its literature. In an appreciative sketch of his life the "Evening Independent" of Massillon, O., says:

Dr. A. W. Ridenour of Massillon, O., died of paralysis on June 26, 1891, after an illness of a little more than two weeks. "None knew him but to love him." He was brusque at times, always impetuous, never anything but honest and conscientious. He was a stamp of manhood which is rare, and to those who were close to him it may with truth be said:

* * * * * "He was a man.

Take him for all in all, we shall not look upon his like again."

Dr. Ridenour was a surgeon. He possessed the qualifications for success in that department of science, as his work during the past fifteen years has amply demonstrated. He was a close student and was ambitious to rank at the head of the profession. He will be sadly missed in this section of the state. His reputation extended to remote parts and he had attained that age of life and established that confidence in the esteem of the people which would have rendered him, could his life have been spared, a pre-eminently useful man to his fellow creatures.

Albertus Ward Ridenour was born near Hagerstown, Md., about forty-eight years ago. His parents removed to Ohio when he was about nine years of age and settled on a farm in Knox County. The family removed to Wooster several

years after, where the deceased spent his boyhood days until the breaking out of the Civil War, when, at the age of sixteen years, he enlisted as drummer in the Sixty-seventh Ohio Regiment. He was discharged from the service after a brief term on account of sickness, but re-enlisted in the One Hundred and Twenty-first Ohio not long after. He served the greater part of his second enlistment as a hospital steward, assisting his brother, Dr. W. T. Ridenour, now of Toledo, O., who was a division surgeon in the Army of the Potomac. After the war he studied medicine with his brother and attended lectures and graduated from the Cincinnati Medical College. He first practiced in Wadsworth, went from there to Canal Fulton and removed to Massillon twenty-one years ago.

Of his residence in this city it seems almost superfluous to speak. His career has been an open book to every citizen who desired to read from its pages. Incidental to the practice of his profession Dr. Ridenour has filled the position of township and county physician, surgeon of two railroads, officiating for the Pittsburgh, Ft. Wayne & Chicago and Wheeling & Lake Erie roads at the time of his death. He also served a number of years as health officer of the city and as a member of the pension examining board. He was mainly instrumental in the creation of the National Association of Railway Surgeons and served as vice-president of the same.

Dr. Ridenour leaves a widow and five children, one son having died about five years ago. In proof of the statement that he was attached to and lived for his family it may be said that he carried life insurance policies aggregating \$20,000 for their benefit, in addition to the other property he had already accumulated.

Peace to the ashes of a good citizen, a true man and a brilliant surgeon.

We regret that we have not the data at our command to give a brief obituary of each member that has died since the organization of our association, which although young in years has had the misfortune to have lost quite a number of its members, which will be observed were among some of the best railway surgeons in the country.

But under the circumstances we will have to content ourselves by giving the roll of those who have left our ranks and gone to the world beyond, of which the following is the complete mortality roll, to the best of our knowledge, up to the present time:

Dr. A. W. Bariteau, Oberlin, Kan.	Dr. A. W. Ridenour, Massillon, O.
Dr. D. P. Bigger, Brainerd, Minn.	Dr. C. V. Rockwell, Taylorville, Ill.
Dr. F. W. Beard, Vincennes, Ind.	Dr. Caleb B. Sipple, Sedan, Kan.
Dr. J. H. Calkins, David City, Neb.	Dr. P. Van Patton, Forest City, Ark.
Dr. Daniel Duckett, Forest, Ill.	Dr. Jesse N. Wilson, Sumner, Ia.
Dr. S. P. Grill, Orville, O.	Dr. Frank J. Weed, Cleveland, O.
Dr. D. J. Holland, Atchison, Kan.	Dr. J. B. Cummings, Forrest City, Ark.
Dr. J. W. Jackson, Kansas City, Mo.	Dr. W. F. Gallaway, Eau Claire, Wis.
Dr. E. L. Lathrop, Ottumwa, Ia.	Dr. B. M. Hughes, Birmingham, Al.
Dr. E. L. Morton, Vernon, Ala.	Dr. J. Jones, Auburn Park, Ill.
Dr. F. C. McConnelly, Vermillion, O.	Dr. Jno. W. McMillin, Columbus, O.
Dr. D. D. Marr, Chesterton, Ind.	Dr. W. F. Peck, Davenport, Ia.
Dr. Benj. Newland, Bedford, Ind.	Dr. Ed. N. Small, Sedalia, Mo.
Dr. David Prince, Jacksonville, Ill.	Dr. Benj. Willson, Higginsville, Mo.

APPENDIX C.

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Ames, A. A., 424 Nicollet Ave., Minneapolis, Minn.	Gen. Surg. C. M. & St. P.	1888
Acheson, A. W., 1419 W. Woodard St., Denison, Tex.	M. K. & T.	1889
Allen, W. H., Rich Hill, Mo.	M. P.	1889
Allen, J. M., Liberty, Clay Co., Mo.	K. & St. J.	1889
Alexander, J. T., Girard, Kan.	K. C. F. L. & M.	1889
Allen, R. W., 1125 Main St., Dallas, Tex.	M. K. & T.	1889
Armstrong, E., Greenleaf, Kan.	Central Branch Mo. Pac.	1889
Armstrong, L. C., Taylorville, Ill.	W. St. L. & Pac.	1889
Alt, A., 1519 Washington Ave., St. Louis, Mo.	M. Pac. (Oculist.)	1889
Angell, C. E., Delphi, Ind.	Wabash.	1889
Alsop, W. N., Shaw, Bolivar Co., Miss.	L. N. O. & T.	1890
Archer, J. D., Holgate, O.	T. St. L. & K. C.	1891
Alley, Wm. H., Forest City, Ark.	St. L. I. M. & S.	1891
Allen, S. J., White River Junction, Vt.	C. V.	1891
Adair, J. H., Owatonna, Minn.	C. & N.	1891
Alling, D. G., Dunkirk, N. Y.	L. S. & M. S.	1891
Appley, W. W., Cochection, N. Y.	N. Y. L. E. & W.	1891
Acomb, J. L., Tidoute, Pa.	W. N. Y. & Pa.	1891
Annis, E. L., La Porte, Ind.		1890
Armstrong, J. M., Ogden, Utah.	R. G. W.	1891
Agnew, A. W., Fayette C. H., Ala.	R. & D.	1891
Anderson, A. B., Pawnee City, Neb.	C. R. I. & P.	1891
Armstrong, C., Carrollton, Ill.	J. & S. E.	1891
Axtell, S. B., Painesville, O.	P. & W.	1891
Anthony, F., Sterling, Ill.	C. & N. W.	1891
Atkinson, R., San Marcos, Tex.	M. K. & T.	1891
Alderman, W. N., Athens, O.	B. & O. S.	1891
Ainsworth, F. K., Los Angeles, Cal.	S. P.	1891
Adair, A. W., Kellogg, Ia.	C. R. I. & P.	1891
Ayres, S., Room 31 Times Building, Kansas City, Mo.	K. C. O. & S.	1891
Beasley, G. F., 62 Ferry St., Lafayette, Ind.	L. N. A. & C.	1888
Bennett, T. H., Prentissvale, Pa.	L. S. & M. S.	1888
Bartlett, G. T., Poplar Bluff, Mo.	St. L. Iron Mt. & Stu.	1888
Burt, F., Norwalk, O.	L. S. & M. S.	1888
Bloomfield, E. M., Peru, Ind.	Wabash Western.	1888
Beach, T. N., West Jefferson, O.	Little Miami.	1888
Bennett, W. P., Crestline, O.	P. Ft. W. & C.	1888
Barth, L., Grand Rapids, Mich.	L. S. & M. S.	1888
Bothin, L. C., Burgettstown, Pa.	P. C. & St. L.	1888
Brook, E. W. P., 206 E. Franklin St., Richmond, Va.	Chief Surg. C. & O.	1888
Booth, D. S., Jr., 500 N. Jefferson Ave., St. Louis, Mo.	I. & G. N.	1888
Barney, R., 411 Jackson St., Chillicothe, Mo.	C. M. & St. P.	1889
Barclay, R., 3211 Lucas Ave., St. Louis, Mo.	M. K. & T.	1889
Bancroft, F. J., Cor. Stout and Fourteenth Sts., Denver, Colo.		
Bradshaw, J. F., Superior, Neb.	Den. & Rio Grande.	1889
Bagby, O., Vinita, Ind. Ter.	Mo. Pac.	1889
Bain, F. D., Kenton, O.	Mo. Kan. & Tex.	1889
Barret, W. H., Harrisonville, Mo.	Chi. & Alton.	1889
Baxter, G. A., 115 E. Eighth St., Chattanooga, Tenn.	M. P. K. C. Chic. & S.	1889
Best, A. J., Centralia, Kan.	C. B.	1889
Beggs, G. W., 511 Fourth St., Sioux City, Ia.	Gen. Branch Mo. Pac.	1889
Breysacher, A. L., 121 W. Second St., Little Rock, Ark.	I. C. & C. M.	1889
Boulware, T. C., Butler, Mo.	Lit. R. & Ft. S.	1889
Brooks, F. V., Evans City, Pa.	Mo. Pac.	1888
Buchanan, J. G., 128 Arch St., Allegheny, Pa.	P. & W.	1888
Buchanan, J. J., Pittsburg, Pa.	P. F. W. & C.	1888
Burchard, O. T., Lindell Hotel, Falls City, Neb.	P. F. W. & C.	1888
Buckley, J. J., Missoula, Mont.	Mo. Pac.	1888
Bullock, F. E., Forest City, Mo.	Chief Surg. N. Pac.	1889
Burke, J. P., N. W. Cor. Oak and Smith Sts., California, Mo.	K. C. St. J. & C. B.	1889
Burres, W. F., Sidney, Ill.	Mo. Pac.	1889
Bryan, J. D., Louisburg, Kan.	Wab.	1889
Buechner, W. L., Youngstown, O.	Mo. Pac.	1889
Bishop, W. T., 211 Pine St., Harrisburg, Pa.	N. Y. L. E. & W.	1889
Barber, A. W., Douglas, Wyo.	Pa. R. R.	1889
Beattie, T., Harrisonville, Mo.	F. E. & M. V.	1890
Below, E., City of Mexico, Berlin.	M. P.	1890
Begley, B. W., Inglesfield, Ind.	Chief Surg. R. R.	1890
Bremmerman, L. T., Downingtown, Pa.	E. & J. H.	1890
Breed, F. L., Seward, Neb.	Penna. Co.	1890
	F. E. & M. V.	1890

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Brush, E. C., 48 Fourth St., Zanesville, O.	C. S. & H.	1890
Brown, L. B., Lincoln, Ill.	P. D. & E. and Ill. Cent.	1890
Bush, J. C. F., Wahoo, Neb.	U. P. & F. E. & M. V.	1890
Burry, Jas., Chicago, Ill.	A. T. & S. F.	1890
Burwell, E. E., Goodland, Kan.	C. R. I. & P.	1890
Bloomfield, R. G., Toledo, Ill.	P. D. & E.	1890
Burry, James, Chicago, Ill.	A. T. & S. F.	1890
Barton, P. H., Danville, Ill.	W. St. L. & P.	1891
Blakeslee, W. R., Forest City, Pa.	N. Y. L. E. & W.	1891
Benjamin, D., Camden, N. J.	Chief Surg. Pa. R. R.	1891
Bennett, G. D., Newton, Kan.	A. T. & S. F. & M. P.	1891
Boarman, C. V., 1104 Md. Ave. S. W., Washington, D. C.	B. & P.	1891
Birdsall, S., 6 Erie St., Susquehanna, Pa.	N. Y. L. E. & W.	1891
Burnett, J., Scranton, Pa.	D. & H.	1891
Barber, O. P., 402 N. Mich. Ave., Saginaw, Mich.	M. C.	1891
Barnett, W. W., Ft. Wayne, Ind.	N. Y. C. & St. L.	1891
Bryant, D. C., Omaha, Neb.	U. P.	1891
Biddle, J. C., Ashland, Pa.	L. V. & P. R.	1891
Baker, M. J., 82 Main St., Hornellsville, N. Y.	N. Y. L. E. & W.	1891
Buechner, W. H., Youngstown, O.	N. Y. P. & O.	1891
Butler, R. W., Wampun, Pa.	P. & L. E.	1891
Baldwin, M. A., Cuthbert, Ga.	S. W. Div. of C.	1891
Benedict, S. C., 106 E. Clayton St., Athens, Ga.	R. & D.	1891
Brannon, G. D., 122 Main St., Crown Point, Ind.	Erie & Wabash.	1890
Bizzell, F. A., 11 Main St., Arcola, Miss.	L. N. O. & T.	1891
Bouffleur, A. I., 738 Washington Blvd., Chicago, Ill.		1891
Burford, H., Brunswick, Ga.	E. T. V. & G.	1891
Boatner, F. P., Potts Camp, Miss.	K. C. M. & S.	1891
Becton, E. P., Sulphur Springs, Tex.	Chief Surg. E. L. & R. R.	1891
Banwell, W. H., Orleans, Neb.	B. & M.	1891
Brown, S. E., 27 Marion St., Eatonton, Ga.	C. R. R. & Ga.	1891
Barritt, A. T., Virden, Ill.	J. S. E.	1891
Bacon, M. L., Wellsboro, Pa.	Fall Brook.	1891
Barritt, W. M., Onarga, Ill.	I. C.	1891
Burd, E., Lisbon, Ia.	C. & N. W.	1891
Baldwin, G., Ruthven, Ia.	C. R. I. & P.	1891
Bell, S., Beloit, Wis.	C. & N. W.	1891
Beebe, W. L., St. Cloud, Minn.	N. P.	1891
Barr, J. C., Mars, Pa.	P. & W.	1891
Boyer, S. S., Marathon, Tex.	S. P.	1891
Bear, A., Norfolk, Neb.	U. P.	1891
Bergen, A. C., Sioux City, Ia.	C. St. P. M. & O.	1891
Brown, J. E., McConnelsville, O.	L. & O.	1891
Budd, J. D., Two Harbors, Minn.	D. & I. R.	1891
Bergstrom, N. A., Cooperstown, N. D.	N. P.	1891
Boggs, A. D., Marquez, Tex.	I. & G. N.	1891
Bradford, T. S., Augusta, Ky.	C. & O.	1891
Booth, J. P., Needles, Cal.	A. & P.	1891
Buckley, B. T., Freeport, Ill.	C. & N. W. & I. C.	1891
Blaisdell, G. C., Contoocook, N. H.	B. & M.	1891
Bell, F. M., Kelso, Wash.	N. P.	1891
Bowen, A. B., Maquoketa, Ia.	C. & N. W.	1891
Bevan, A. D., Portland, Ore.	U. P.	1891
Bracken, J. K. W., Springville, Utah.	R. G. W.	1891
Boardman, H. P., Oakes, N. D.	N. P. & C. & N. W.	1891
Billings, J. M., Lebanon, Mo.	St. L. & S. F.	1891
Barnett, B. M., Rosedale, Kan.	K. C. Ft. S. & M.	1891
Bialock, W. C., Kosse, Tex.	H. & T. C.	1891
Beatty, T. B., 509 E. First St., Salt Lake City, Utah.	U. P.	1891
Barrel, C. C., 2107 Postoffice St., Galveston, Tex.	I. & G. N.	1891
Booth, H. A., Labadie, Miss.	St. L. K. C. & C.	1891
Brayton, C. E., Stonington, Conn.	Chief Surg. N. Y. P. & B.	1891
Brannan, T. H., Canal Dover, O.	C. L. & W.	1891
Blakeslee, W. R., Coatesville, Pa.	Penna.	1891
Bley G., Beardstown, Ill.	O. & M.	1891
Bascom, F. S., 435 S. W. Temple St., Salt Lake City, Utah.		
Bowcock, B. L., Anniston, Ala.	R. G. W.	1891
Brown, J. W., Silverton, Colo.	R. & D.	1891
Branch, W. G., Bunkie, La.	D. & R. G.	1891
Conn, G. P., 130 N. Main St., Concord, N. H.	T. & P.	1891
Chapman, W. A., Hastings, Neb.	Chief Surg. C. & M.	1888
Campbell, T. B., West Lebanon, Ind.	B. & M.	1888
Comigor, J. A., Indianapolis, Ind.	Wabash-Ill. Cent.	1888
Chapman, G., Hudson, Mich.	L. N. A. & C.	1888
Crouse, D. W., Waterloo, Ia.	L. S. & M. S.	1888
Carr, E. C., Coshocton, O.	Ill. Cent.	1888
Connor, H. J., West Superior, Wis.	P. C. & St. L.	1888
Caldwell, F. H., Sanford, Fla.	Chief Surg. S. F.	1888
Chambers, P. H., Lexington, Mo.	Mo. Pac.	1889
Chesney, Jno. A., Bucyrus, O.	P. F. W. & C.	1889

ASSOCIATION OF RAILWAY SURGEONS.

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NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Conrad, A., Crete, Neb.	Mo. Pac.	1889
Cokenower, H. L., Clarinda, Ia.	Chief Surg. C. B. & Q.	1889
Courtney, W., Brainerd, Minn.	N. P.	1889
Cott, G. W., Missouri Valley, Ia.	Chief Surg. F. E. & M. V.	1889
Cole, C. K., 812 Madison Ave., Helena, Mont.	Chief Surg. G. N.-Mon. Cent.	1889
Cory, A. L., Chicago, Ill.		1890
Cook, C., Fowler, Ind.	C. C. C. & St. L.	1890
Calaway, L. N., 105 W. Cherry, Nevada, Mo.	M. P. & M. K. & T.	1890
Christopher, D. I., Colorado Springs, Colo.	C. R. I. & P.	1890
Ohenoweth, W. J., 151 W. Main, Decatur, Ill.	P. D. & E.	1890
Childs, O. D., Cor. Market and Broadway, Akron, O.	C. A. & C.	1890
Charlton, T. J., Savannah, Ga.	S. F. & W.	1890
Clark, A. M., Youngstown, O.	P. & L. E. and P. W.	1890
Cooke, E. H., Herrington, Kan.		1890
Coury, T. J., Florence, Kan.	A. T. & S. F.	1890
Curtner, P. H., Hazelton, Ind.	E. & T. H.	1890
Cooper, H. P., Atlanta, Ga.	Chief Surg. A. & W. P.	1891
Cross, E. W., Rochester, Minn.	C. & N. W.	1891
Cummings, D. S., Waseca, Minn.	C. & N. W.	1891
Curtiss, A. M., Buffalo, N. Y.	W. S.	1891
China, A., Sumter, S. C.	A. C. L.	1891
Cavana, M., Oneida, N. Y.	N. Y. O. & W.	1891
Chasaignac, O., 155 Louisiana Ave., New Orleans, La.	I. C.	1891
Calkins, H. T., Petoskey, Mich.	G. R. & I.	1891
Chaffee, G., 201 Forty-seventh St., Brooklyn, N. Y.	L. C. & B. C.	1891
Carothers, W. H., Hamline, Minn.	U. P.	1891
Charles, J., Newport News, Va.	C. & O.	1891
Carlton, J. M., Mt. Carmel, S. C.	G. C.	1891
Chapman, N. H., Monte Vista, Colo.	D. & R. G.	1891
Clark, I. E., Schulenburg, Tex.	S. P.	1891
Cook, E. T., Houston, Tex.	S. P.	1891
Carter, D. D., Woodstock, Va.	B. & O.	1891
Chalker, W. E., Lake City, Fla.	F. C. & P.	1891
Carleton, W., Rochelle, Ill.	C. & N. W.	1891
Chapple, H., Billings, Mont.	N. P.	1891
Crain, F. M., Doland, S. D.	C. & N. W.	1891
Cook, J. R., Montana Mines, W. Va.	B. & O.	1891
Cochran, E. G., 23 Capulin St., Sllao, Guanajuata, Mex.	M. C.	1891
Cook, J. A., Orting, Wash.	N. P.	1891
Clark, L. A., 306 Oak St., Rockford, Ill.		1891
Cloud, A. E., Kiowa, Kan.	M. P.	1891
Cyrus, W. H., Palatka, Fla.	J. T. & K. W.	1891
Chitwood, J., Connersville, Ind.	C. C. C. & St. L.	1891
Core, C. B., Solomon City, Kan.	U. P.	1891
Crain, F. W., Sheldon, Ia.	C. St. P. M. & O.	1891
Cole, H. B., Black River Falls, Wis.	C. St. P. M. & O.	1891
Cole, H. W., Portland, Ore.	N. P.	1891
Craven, T. H., Canon City, Colo.	D. & R. G.	1891
Craig, J. Harvey, Mansfield, O.	N. Y. P. & O.	1891
Deering, A. A., Boone, Ia.	C. & N. W.	1888
Dewey, G. M., Keytesville, Mo.	Wabash & Western.	1888
Donnelly, Jas., Toledo, O.	Wab.	1888
Dorr, L. L., 405 Montgomery St., San Francisco, Cal.	S. P.	1888
Duncan, W., 76 S. Broad St., Savannah, Ga.		1888
Dale, F. D., Augusta, Ark.	M. P.	1889
Damerell, R., Red Cloud, Neb.	B. & M. R. Neb.	1889
Doughty, W. H., 312 Washington St., Augusta, Ga.	C. R. R. & B. Co.	1889
Donnell, T. C., Franklin, Ind.	P. F. W. & C.	1889
Duggins, G. G., 420 1/2 Santa Fe Ave., Pueblo, Colo.	M. P.	1889
Duncan, J. H., 1042 Main St., Kansas City, Mo.	Wab. Wes.	1889
Dye, A. A., 140 Gulf St., Lamar, Mo.	M. P.	1889
Davis, J., New Carlisle, Ind.	L. S. & M. S.	1890
Day, W. C., 647 Main St., Danville, Va.	R. & D.	1890
Dougherty, P., Junction City, Kan.	U. P. & M. R. & T.	1890
Darby, D. B., Walhalla, S. C.	G. & C. R. & D.	1890
Dickson, J. A., Ashtabula, O.	L. S. & M. S.	1890
Dinnen, J. M., 69 W. Wayne St., Ft. Wayne, Ind.	N. Y. C. & St. L.	1890
Doyle, O. M., Seneca, S. C.	R. & D.	1890
Doolin, T., Ashgrove, Mo.	K. C. S. & M.	1890
Dryden, E. C., Winslow, A. T.	A. & P.	1890
Dunham, J. D., Pattansburg, Mo.	Wab.	1890
Davenport, W. H., Vincennes, Ind.	E. & T. H.	1890
Drake, N. A., 1001 Harrison St., Kansas City, Mo.	C. R. I. & P.	1890
Dale, J. R., 8700 Caddo St., Arkadelphia, Ark.	Chief Surg. U. T. A. & M.	1890
Duncan, J. A., 1107 Broadway, Toledo, O.	Wab.	1890
Daggett, B. H., Buffalo, N. Y.	D. L. & W.	1891
Daniels, C. M., Buffalo, N. Y.	N. Y. L. E. & W.	1891
Dyer, D. A., St. Peters, Mo.	W. & B.	1891
Donnan, E. N., New Castle, Pa.	P. & L. E. and P. & W.	1891
Daily, F. M., Beloit, Kan.	M. P.	1891
Daniels, A. W., St. Peter, Minn.	C. & N. W.	1891
Duncan, B. A., West Point, Miss.	G. P.	1891

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Day D., 615 S. Farnill, St., Eau Claire, Wis.	C. M. & St. P.	1891
Davis, E. F., Oil City, Pa.	A. V.	1891
Dampler, C. E., Cookston, Minn.	G. N. & N. P.	1891
Darr, H. H., Caldwell, Tex.	G. C. & S. F.	1891
Duncomb, E., Glenwood Springs, Colo.	D. & R. G.	1891
Darling, A. L., Topeka, Ill.	J. S. E.	1891
Dodge, F. A., Le Sueur, Minn.	C. St. P. M. & O.	1891
Levries, J. S., Fremont, Neb.	U. P.	1891
Dalley, W. E., 624 S. Wall St., Paris, Tex.	St. L. & S. F.	1891
Doane, O. D., The Dalles, Ore.	U. P.	1891
Dieffenbacher, P., Havana, Ill.	J. S. E.	1891
Darling, L., Lawrenceville, Pa.	Fall Brook.	1891
Darby, J. I., Columbia, Ala.	G. C.	1891
Dutton, S. W., McCracken, Kan.	M. P.	1891
Evans, E. B., Greencastle, Ind.	C. C. C. & St. L.	1888
Everett, M. H., Lincoln, Neb.	B. & M. R.	1888
Evans, F. R., Franklin, O.	C. C. C. & St. L.	1888
Ewh, G., Main St., Talmage, Neb.	Mo. Pac.	1889
Eads, B. F., 303 Houston Ave., Marshall, Tex.	Chief Surg. Tex. & Pac.	1889
Eshback, H. C., Albion, Ia.	Ia. Cent.	1889
Elliott, Wm. H., 129 Jones St., Savannah, Ga.	Chief Surg. Cent. R. R. of Ga.	1889
Ellsworth, P. H., Hot Springs, Ark	Hot Springs.	1889
Earle, T., Greenville, S. C.	R. & D.	1890
Eddy, J. W., Oswego, N. Y.	R. W. & O.	1890
Eberhard, E. L., South Whitley, Ind.	N. Y. C. & St. L.	1891
Edie, O. J., Grand Rapids, Mich.	L. S. & M. S.	1891
English, J. E., Baraboo, Wis.	C. & N. W.	1891
Ellinwood, A. G., Attica, N. Y.	N. Y. L. E. & W.	1891
Evans, C. D., Twelfth and Olive Sts., Columbus, Neb.	B. & M.	1891
Emanuel, M. F., Weatherford, Tex.	T. & P.	1891
Estes, W. L., South Bethlehem, Pa.	L. V.	1891
Engle, T., State Center, Ia.	C. & N. W.	1891
Edwards, A. G., Marysville, Kan.	U. P.	1891
Evarhard, W. H., Volga, S. D.	C. & N. W.	1891
Epley, F. W., New Richmond, Wis.	C. St. P. M. & O.	1891
Eitmueller, G., Hermann, Mo.	M. P.	1891
Enfield, C., Jefferson, Ia.	C. & N. W.	1891
Entricken, F. W., Findlay, O.	T. C. & C.	1891
Estland, J. S., Judsonia, Ark.	I. M. & S.	1891
Edwards, J. B., Denton, Tex.	T. & P.	1891
Eates, N. D., Alamosa, Colo.	D. & R. G.	1891
Ellis Wm. E., Ironwood, Mich.	W. C.	1891
Eccleston, A. H., Wood River Junction, R. I.	N. Y. P. & B.	1891
Ewing, W. P., 756 Kanawaka, Charleston, W. Va.	C. & O.	1891
Erwin, F. H., 317 Cherokee St., South Bethlehem, Pa.	L. V.	1891
Eddy, J. H., Wakefield, Mich.		1891
Etchison, E. C., Gaithersburg, Md.	B. & O.	1891
Evans, W. T., Groton, S. D.	C. M. & St. P.	1891
Evans, F. T., Chester, Pa.	B. & O.	1891
Etchison, E. H., Gaithersburg, Md.	B. & O.	1891
Evans, J. M., Evansville, Wis.	C. & N. W.	1891
Fairchild, D. S., Ames, Ia.	C. & N. W.	1888
Firestone, W. W., Wooster, O.	Penna.	1888
Folke, F. C., Way Cross, Ga.	S. F. & W.	1888
Ford, J. H., Wabash, Ind.	Chief Surg. C. W. & M.	1888
Field, J. T., Ft. Worth, Tex.	M. K. & T.	1889
Franklin, J. A., Cameron, Mo.	H. & St. J.	1889
Fitzgerald, D. H., Wetmore, Kan.	Mo. Pac.	1889
Finney, J., Clintonville, Wis.	M. L. S. & W.	1889
Fortner, B. T., Vinita, Ind. Ter.	M. K. & T.	1889
Foster, W. S., 129 Wylie Ave., Pittsburg, Pa.	B. & O.	1889
Fulton, J. F., St. Paul, Minn.	N. P.	1889
Fairly, P., Jackson, Miss.	N. J. & C.	1890
Farrar, W. H., De Soto, Mo.	I. M. & M. P.	1890
Franke, S. A., Newton, Jasper Co., Ill.	P. D. & E.	1890
Fernandez, J. D., Jacksonville, Fla.	S. F. & W.	1890
Fry, C. B., Mattoon, Ill.	C. C. C. & St. L.	1890
Flexer, L. A., Famanend, Pa.	L. V.	1891
Free, S. M., Beachtree, Jefferson Co., Pa.	B. R. & P.	1891
Fulllove, T. W., Valden, Miss.	I. C.	1891
Fisher, O., Custer City, S. D.	B. & M.	1891
Fisher, C. R. P., Bound Brook, N. J.	L. V.	1891
Fitzgerald, F., Morrison, Ill.	C. & N. W.	1891
Fowler, B. F., Galena, Ill.	I. C.	1891
Fanning, F. W., Butler, DeKalb Co., Ind.	Wab.	1891
Ford, L. C., Lima, Mont.	U. P.	1891
Fox, P., 122 E. Johnson St., Madison, Wis.	C. & N. W.	1891
Field, J. C., Denison, Tex.	H. & T. C.	1891
Flick, D. W., Rapid City, S. D.	F. E. & M. V.	1891
Ford, De S., Augusta, Ga.	G. R. R. Co.	1891
Fegers, C. H., McHenry, Ill.	N. W.	1891

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Fitzgerald, O. D., Los Angeles, Cal.	Chief Surg. S. C.	1891
Francis, S. O., White Bear, Minn.	St. P. & D.	1891
Fen, C., Hendersonville, N. C.	R. & D.	1891
Grinstead, W. F., Charleston, Mo.	St. L. I. M. & S.	1888
Greene, J. H., 481 Locust St., Dubuque, Ia.	C. St. P. & K. C.	1888
Gafford, C. C., Wymore, Neb.	B. & M. R.	1888
Garlock, F. R., 534 Monument Square, Racine, Wis.	C. M. & St. P.	1888
Gerrish, A. A., Lowell, Ind.	L. N. A. & C.	1888
Gumaer, A. G., 802 Bailey Ave., Buffalo, N. Y.	L. S. & M. S.	1888
Graves, J. F., Montgomery City, Mo.	W. W.	1888
Griffith, J. D., Blalto Building, Kansas City, Mo.	M. P.	1888
Garner, E. S., 613 Francis St., St. Joseph, Mo.	St. J. & G. I.	1889
Gaulding, T. B., Ironton, Mo.	M. P. & J.	1889
Gilcreest, J. E., 490 Dickson, St., Gainesville, Tex.	M. K. & T.	1889
Grove, F. A., Quincy, Ill.	Wab.	1889
Goode, R., Mobile, Ala.	M. O. & O. H.	1889
Gooden, W. F., 108 M. Sheets St., Aurora, Neb.	B. & M.	1889
Gargara, P., Wynne, Cross Co., Ark.	St. L. I. M. & S.	1890
Galbraith, W. J., Omaha, Neb.	Gen. Surg. U. P.	1890
Griswold, L. S., Big Rapids, Mich.	G. R. & I.	1890
Gilbert, J. S., Kendallville, Ind.	G. R. & I.	1890
Golden, L. A., Cedarville, Kan.	Mo. Pac.	1890
Gore, D. C., Paris, Mo.	M. K. & T.	1890
Graves, A. C., Cherokee, Kan.	K. C. & Ft. S.	1890
Graham, J. F., Malvern, Ark.	St. L. I. M. & S.	1890
Grubbs, O. W., Harrison, O.	B. F. & Ft. W.	1890
Gunn, R. D. A., Wellsville, O.	Penna. Co.	1890
Gillard, D., Port Clinton, O.	L. S. & M. S.	1891
Greene, G. H., 152 State St., Marshall, Mich.	C. J. & M.	1891
Garber, T. W., Muskegon, Mich.	C. & W. M.	1891
Green, T. C., Hornellsville, N. Y.	N. Y. L. E. & W.	1891
Gildier, D., Rockwood, Pa.	B. & O.	1891
Glasgow, S. H., Welland P. O., Ont., Can.	G. & T.	1891
Govan, W., Main St., Stony Point, N. Y.	W. & S.	1891
Griswold, E., 359 State St., Sharon, Pa.	N. Y. P. & O.	1891
Guthrie, W. E., Bloomington, Ill.	C. & A.	1891
Gates, M. A., Ronceverte, W. Va.	C. & O.	1891
Groves, J. E., Uhrichsville, O.	C. L. & W.	1891
Goble, E. T., Earlville, Ill.	C. & N. W.	1891
Godfrey, H. T., Galena, Ill.	I. C.	1891
Gibson, R., Charlotte, N. C.	R. & D.	1891
Green, W. N., Webster City, Ia.	O. & N. W.	1891
Gibbs, D. C., Crawford, Neb.	F. E. & M. V.	1891
Graves, A., San Antonio, Tex.	Med. Div. of S. P.	1891
Gray, A. W., Gallad, Tex.		1891
Gaston, J. B., Metropolitan, Mich.	C. & N. W.	1891
Geyer, J. L., Norwich, O.	B. & O.	1891
Griunell, A. P., 272 Main St., Burlington, Vt.	Chief Surg. C. V.	1891
Graves, C., Aitkin, Minn.	N. P.	1891
Garwood, A., New Braunfels, Tex.	I. & G. N.	1891
Gallagher, B. H., Fordyce, Ark.	St. L. S. W.	1891
Griswold, E. H., Peru, Ind.	Wabash.	1891
Hovey, B. L., 34 N. Fitzhugh St., Rochester, N. Y.	B. R. & P.	1888
Hearne, J. C., St. Joseph, Mo.	Chief Surg. H. & St. J.	1888
Holliday, W. S., Monmouth, Ill.	I. C.	1888
Hunter, H. E., Newton, Ia.	Gen. Ia.	1888
Higgins, C. E., Peru, Ind.	Wab.	1888
Hostetter, W. B., 145 N. Water St., Decatur, Ill.	Wab.	1888
Hulett, R. F., Rich Hill, Mo.		1888
Hollenbeck, A. G., Willow Springs, Mo.	K. C. F. S. & G.	1888
Henderson, A. G., 12 Main St., Imboden, Ark.	K. C. Ft. S. & M.	1888
Huselson, W. S., 17 Hockton Ave., Allegheny, Pa.	P. & W.	1888
Hardy, N., Massillon, O.	P. F. W. & C.	1888
Hall J. E. P. O. Box 55, Weeping Water, Neb.	Mo. Pac.	1889
Huntley, J. H., Jagger, O.	Chl. & At.	1889
Hawley, J. E., Burr Oak, Kan.	Mo. Pac.	1889
Howard, H. C., Opera House Block, Main St., Cham-		
paign, Ill.	Wab.	1889
Hickerson, E. R., Moberly, Mo.	W. W. and M. K. & T.	1889
Hobbs, N. R., Elmwood, Neb.	Mo. Pac.	1889
Howlett, R. E., Otterville, Mo.	Mo. Pac.	1889
Humgate, J. B., Conway Springs, Kan.	Mo. Pac.	1889
Hudson, M. F., Osborne, Kan.	Mo. Pac.	1889
Hughes, W. C., Cleves, O.		1890
Hamilton, J. M., Verona, Pa.	Allegheny Valley.	1890
Holmes, A. M., Kingfisher, Ind. Ter.	C. R. I. & P.	1890
Haldeman, J. H., Paola, Kan.	M. K. & T.	1890
Harper, W. H., Lima, O.	P. F. W. & C.	1890
Haden, J. T., Crawfordsville, Ark.	St. L. I. M. & S.	1890
Haley, O., Fredericktown, Mo.	St. L. I. M. & S.	1890
Hall, W. C., Coffeyville, Kan.	M. P.	1890

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Hayes, J. M., Oxford, N. C.	R. & D.	1890
Harriman, O. B., Hampton, Ia.	I. C.	1890
Hastinger, H. E., Olathe, Kan.	A. T. & S. F.	1890
Halcomb, G. W., Clinton, Mo.	K. C. C. & S.	1890
Hileman, S., Sharon, Pa.	L. S. & M. S.	1890
Henry, W. C., Aurora Ind.	O. & M.	1890
Highsmith, G. R., 106 N Main St., Carrollton, Mo.	A. T. & S. F.	1890
Hooper, E. M., Wilson, La.	L. N. O. & Y.	1890
Homes, L. O., Marceline, Mo.	A. T. & S. F.	1890
Hume, C. R., Anadarko, Okla.	R. I.	1890
Hobson, J. F., Cleveland, O.	Penna.-Valley.	1890
Humfreville, D. W., Waterville, Kan.	M. P.	1890
Hunt, W. R., Coal Hill, Ark.	L. R. & S. F.	1890
Holcomb, C. B., Corning, O.	T. & O. C.	1891
Hall, G. N., Binghamton, N. Y.	N. Y. L. E. & W.	1891
Halbert, J. E., Mound Landing, Miss.	L. N. O. & T.	1891
Hamilton, S. S., Punxsutawney, Pa.	B. R. & P.	1891
Henkel, A. M., Staunton, Va.	C. & O.	1891
Hughart, J. P., Sewell Depot, Fayette Co., W. Va.	C. & O.	1891
Hawley, W. H., 21 and 23 Waymer St., Penn Yan, N. Y.	N. C.	1891
Hanger, C., Clarence, Mo.	H. & St. J.	1891
Hunt, J. H., 17 Ball St., Port Jervis, N. Y.	N. Y. L. E. & W.	1891
Hewitt, J. M., 433 S. Division St., Buffalo, N. Y.	Asst. Chief Surg. Erie	1891
Hall, A. L., Fair Haven, N. Y.	L. V.	1891
Hulett, J. B., Middletown, N. Y.	N. Y. O. & W.	1891
Hunt, J. G., Utica, N. Y.	N. Y. O. & W.	1891
Harris, R. L., Oakland, Fla.	Chief Surg. O. B.	1890
Hutton, W., Elizabeth, Ill.	C. St. P. & K. C.	1891
Hays, J. W., Albion, Ind.	B. & O.	1891
Harvey, C. C., Dundee, N. Y.	F. B. & C.	1891
Hamilton, S. N., Cornersville, Ind.	C. H. & D.	1891
Hoover, I. C., Columbus, O.	P. C. C. & St. L.	1891
Hall, J. N., Sterling, Colo.	B. & M. R.	1891
Helper, B. F., Ft. Scott, Kan.	M. P.	1891
Hubbard, C. M., Virginia, Cass Co., Ill.	O. & M.	1891
Hobart, A. J., 223 Fifth Ave., Clinton, Ia.	C. & N. W.	1891
Hoering, G. P., Walnut, Ia.	C. R. I. & P.	1891
Hocker, W. A., Evanston, Wyo.	U. P.	1891
Harrison, G. W., 121 E Front St., Ashland, Wis.	W. C.	1891
Horn, T. G., Colorado Springs, Colo.	U. P.	1891
Hanawalt, G. P., Des Moines, Ia.	D. M. & N. W.	1891
Hays, N., Seneca, Kan.	U. P.	1891
Hardrich, H., Albuquerque, N. Mex.	A. & P.	1891
Hedrick, J. S., Dunkirk, O.	T. C. & C.	1891
Higbee, E. H., Roodhouse, Ill.	C. & A.	1891
Handy, J. C., Tucson, Ariz.	S. P.	1891
Hundley, J. H., Olney, Ill.	O. & M.	1891
Hixson, M. M., Dupont, O.	T. St. L. & K. C.	1891
Hasemeier, J. A., Louisville, Neb.	B. & M.	1891
Hart, J. A., Colorado Springs, Colo.	D. & R. G.	1891
Harrison, B. D., Sault de Ste. Marie, Mich.	D. S. S. & A.	1891
Haumer, R. B., Greensburg, Pa.	Penna. R. R.	1891
Hollister, W. L., Austin, Minn.	C. St. P. & K.	1891
Haddy, G. H., Eagle River, Wis.	M. L. S. & W.	1891
Hollenbeck, B. W., Westville, Ind.	B. & O.	1891
Henry, A. G., North Baltimore, O.	B. & O.	1891
Henderson, W. H., Kingston, Ont., Can.	K. & P.	1891
Headlee, S. H., St. James, Mo.	St. L. & S. F.	1891
Hawes, J., Greeley, Colo.	U. P.	1891
Harmony, P., Wadsworth, Nev.	S. P.	1891
Isbell, J., Washington, Mo.	M. P.	1889
Iden, B. F., Manassas, Va.	R. & D.	1891
Ingersoll, L. F., Grand Junction, Colo.	D. & R. G.	1891
Ibach, F. G., Mauch Chunk, Pa.	L. V.	1891
Jackson, J. F., Kansas City, Mo.	Wab.	1888
Jenkins, J. W., St. Louis, Mo.	M. P.	1888
Jackson, J. A., Madison, Wis.	C. M. & St. P.	1888
Jackson, A. P., Oakfield, N. Y.		1888
Jordan, S. A., Columbus, Ga.	G. M.	1889
Jones, J. L., Jonesburg, Mo.	W. W.	1889
Johnson, S. R., Moberly, Mo.	O. & St. L.	1889
Johnson, G. K., Grand Rapids, Mich.	Chief Surg. G. R. I.	1889
Jenkins, C. W., Williamsville, Mo.	St. L. I. M. & T.	1889
Justice, J. D., Belle Plaine, Kan.	Mo. Pac.	1889
Jones, G. W., Burlington, Ia.	C. B. & Q.	1889
Johnson, C. M., St. Charles, Mo.	Wab.	1889
Jones, H. G., 223 Genesee St., Utica, N. Y.	West Shore.	1890
Jeannotte, J. A., Clyde, Kan.	Cen Brch. Mo.	1890
Jenkins, W. O., 14 S. Seventh St., Terre Haute, Ind.	Big Four	1888
Jenkins, E. R., Washington, Ia.	C. R. I. & P.	1891
Janss, J., Grand Island, Neb.	B. & M.	1891

ASSOCIATION OF RAILWAY SURGEONS.

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NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Jay, M., 70 State St., Chicago, Ill.	Chief Surg. C. & E. I.	1891
Jameson, D. A., Navasota, Tex.	G. C. & S. F.	1891
Jacobs, L. D., Emporia, Kan.	A. T. & S. F.	1891
Jackson, W. H., 38 Main St., Springville, N. Y.	B. R. & P.	1891
Johnson, A., Montrose, Colo.	D. & R. G.	1891
Klingensmith, I. P., Blairsville, Pa.	Penna. R. R.	1888
Kean, O. L., Wooster, O.	W. & L. E.	1888
King, W. P., N. E. Cor. Eighth and Main Sts., Kansas City, Mo.	Asst. Chief Surg. Mo. Pac.	1888
Knott, S. J., Crawfordsville, Ark.	Iron Mt. & S.	1889
Keiser Jas. M., Parsons Kan.	M. K. & T.	1889
Keller, L., Beury, W. Va.	C. & O.	1889
Knox, M. D., Box 91, Hillsboro, Tex.	M. K. & T.	1889
Koogler, M. A., El Dorado, Kan.	Mo. Pac.	1889
Kellenberger, E. K., Yates Center, Kan.	Mo. Pac.	1889
Kaster, J. P., Albuquerque, N. M.	A. & P.	1890
Kesner, C. C., Main St., Le Roy, Kan.	Mo. Pac.	1890
Kellar, A. F., Sullivan, Ill.	P. D. & E.	1890
King, C., Machias, N. Y.	B. R. & P.	1891
Keene, L. S., La Porte, Ind.	L. S. & M. S.	1891
Kneeland, C. J., Traverse City, Mich.	C. & W. M.	1891
Kelly, Webb J., Gallion, O.	Big Four.	1891
King, C. F., Hudson, Wis.	C. St. P. M. & O.	1891
Kauffman, J. S., Blue Island, Ill.	C. R. I. & P.	1891
Knapp, A. R., Leoti, Kan.	M. P.	1891
King, E. Y., Richwood, O.	N. Y. L. E. & W.	1891
Kenyon, D. L., Worthington, Minn.	C. St. P. & M.	1891
Kimbrough, G. R., Emory, Tex.	M. K. & T.	1891
Kirchner, P. J., 310 Felix St., St. Joseph, Mo.	C. R. I. & P.	1891
Kean, N. L., Northwood, Ia.	B. C. R. & N.	1891
Kearns, A. J., Loup City, Neb.	B. & M. R.	1891
Kimball, C. B., West Liberty, Ia.	C. R. I. & P.	1891
Kerr, A. F., Millboro Depot, Va.	C. & O.	1891
Livingston, T. P., 622 Main St., Plattsmouth, Neb.	B. & M. R.	1888
Lewis, J. R., Grinnell, Ia.	Gen. Ia.	1888
Linville, D. G., Columbia City, Ind.	Wab. Western.	1888
Lee, E. W., Chicago, Ill.	P. R. R.	1888
Lewis, E. R., Kansas City, Mo.	Wab. Western.	1888
Lawrence, W. B., Batesville, Ark.	St. L. I. M. S.	1888
Lower, M. O., North Manchester, Ind.		1890
Lauphear, S. E., Kansas City, Mo.	Wab. Western.	1889
Lynn, W. H., Hastings, Neb.	Mo. Pac.	1889
Loope, G. L., Bessemer, Mich.	M. L. S. & W.	1889
Loop, D. D., North East Erie Co., Pa.	L. S. & M. S.	1889
Lyles, R. J., Byhalia, Miss.	K. C. M. & B.	1889
Love, Frank S., Belle Plaine, Kan.	Mo. Pac.	1889
Linville, M., 35 N. Mercer St., New Castle, Pa.	E. & P.	1889
Lears, J. I., Chadron, Neb.	F. E. & M. V.	1890
Lightner, S. B., Sabina, O.	C. & C. M.	1890
Lindsay, T., Garnett, Kan.	A. T. & S. F.	1890
Long, J. M., Minden Mines, Mo.	M. P.	1890
Love, I. N., St. Louis, Mo.	Mo. R. R. Co.	1890
Lykes, R. B., Joplin, Jasper Co., Mo.	M. P.	1890
Lusk, Z. J., Warsaw, N. Y.	B. R. & P.	1891
Leavitt, B. C., Denver, Colo.	D. & R. G.	1891
Landrum, J. B. O., Landrum, S. C.	A. & S.	1891
Longshore, W. R., 71 Church St., Hazleton, Pa.	L. V.	1891
Lutterloh, C. M., Jonesboro, Ark.	K. C. Ft. S. & M.	1891
Lyman, H. H., Fillmore, N. Y.	W. N. Y. & Pa.	1891
Lynde, N. C., 241 Swan St., Buffalo, N. Y.	Chief Surg. W. N. Y. & Pa.	1891
Loughridge, W. E., Mansfield, O.	B. & O.	1891
Lipscomb, C., Denton, Tex.	M. K. & T.	1891
Le Blond, J. B., 117 Phillips Ave., Sioux Falls, S. D.	St. P. M. & M.	1891
Lewis, T. M., Hearne, Tex.	H. & T. C.	1891
Lacy, T. B., 540 Sixth Ave., Council Bluffs, Ia.	C. & N. W.	1891
Lyman, C. B., 1517 Stout St., Denver, Colo.	U. P.	1891
Logan, R. R., Falcon, Colo.	U. P.	1891
Lane, W. H., Miller, S. D.	C. & N. W.	1891
Leech, L. J., West Branch, Ia.	B. C. R. & N.	1891
Le Fevre, E., Sidney, O.	C. H. & D.	1891
Lee, E. A., 20 Linden St., Ft. Collins, Colo.	U. P.	1891
Logan, H., The Dalles, Ore.	U. P.	1891
Myers, S. N., Martinsburg, W. Va.	B. & O.	1888
McCollum, E. J., Tiffin, O.	N. W. O. and B. & O.	1888
Martin, J. H., Greenville, Pa.	Chief Surg. P. S. & L. E.	1888
McArthur, D. S., 205 Main St., La Crosse, Wis.	C. B. & N.	1888
Marks, S., 136 Wisconsin St., Milwaukee, Wis.	Chief Surg. C. M. & St. P.	1888
Murphy, J. H., St. Paul, Minn.	Chief Surg. C. St. P. M. & O.	1888
Mackie, W., 107 Wisconsin St., Milwaukee, Wis.	O. M. & St. P.	1888
Murdock, J. B., 4232 Fifth Ave., Pittsburg, Pa.	P. O. & St. L.	1888
McIntyre, J. H., St. Louis, Mo.	Chief Surg. St. L. & San F.	1888

PROCEEDINGS OF THE NATIONAL

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Middelkamp, H. H., Warrenton, Mo.	Wab. Western.	1888
McHatton, H., Macon, Ga.	E. T. V. & G.	1888
Mooney, H. C., Laketon, Ind.	C. & A.	1888
Morton, D. K., Missouri City, Mo.	Wab. Western.	1888
McCurdy, S. L., Grant St., Dennison, O.	P C. & St. L.	1888
Meyers, C. W., Clinton, Ia.		1888
Miller, D. P., Huntingdon Pa.		1888
Murray, L. F., Holden, Mo.	M. P.	1889
Moore, Wm. A., 230 Washington St., Binghamton, N. Y.	D. L. & N.	1889
Moore, A. B., Gurdon, Ark.	St. L. S. M. & I.	1889
Millam, B. J., Macon City, Mo.	Wab.	1889
Mudd, J. R., St. Charles, Mo.	Wab. Western.	1889
Mullen, Jr., A. J., 321 Franklin St., Michigan City, Ind.	M. C.	1889
Murray, T. J., Butte, Mont.	U. P.	1889
Mansfield, A. S., Quality Hill, Ashland, Neb.	B. & M. R.	1889
Mitchell, J. W., Superior, Neb.	M. V.	1889
Mendenhall, R. G., La Cygne, Kan.	K. C. Ft. S & W.	1889
Mahon, W. T., Chamois, Mo.	M. P.	1889
Magie, W. H., Duluth, Minn.	N. P.	1889
Moore, A. W., Fayette, Mo.	M. K. & T.	1889
MacIn, W. T., 10 S. Division St., Duquoin, Ill.	St. L. & C.	1889
McMahan, R. W., Quincy, Ill.	W. St. L. & P.	1889
McCandless, W. L., Pinckneyville, Ill.	St. L. A. & T. H.	1889
McNeill, M. J., Olive Branch, Miss.	K. C. M. & B.	1889
McCoy, P. Y., Evansville, Ind.	L. & W.	1889
McEbright, T., Akron, O.	C. A. & C.	1889
McKiossen, J. A., Clinton, Ia.	C. B. & Q.	1889
McCulley, W. A., Independence, Kan.	M. P.	1889
Merz, C. H., Sandusky, O.	L. S. & M. S.	1889
Miller, E. J., Marion, S. D.		1889
Mussey, W. L., 68 W. Eighth St., Cincinnati, O.	Chief Surg. O. & M.	1890
Miller, V. M., Townley, Ala.	K. C. N. C. B. & H.	1890
Martin, A., Hardy Station, Miss.	J. C.	1889
Martin, Z. T., Lathrop, Mo.	H. & St. J.	1890
MacIay, A. I., Delavan, Ill.	P. D. & E.	1890
McAlester, A. W., Columbia, Mo.	Wab.	1890
McBride, G. A., Ft. Gibson, Ind. Ter.	M. P.	1890
Mitchell, S., Jacksonville, Fla.	Chief Surg. J. T. & K. W.	1890
Miller, C. W., Doniphan, Mo.	St. L. I. M. & S.	1890
Milner, J. O., Kansas City, Kan.	M. O.	1890
Miller, A. B., Macon, Mo.	H. & St. J.	1890
McConaughy, R., York, Neb.	F. E. & M. V.	1890
Morehouse, H. W., Danville, Ill.	Chief Surg. Wab.	1890
McMahon, W. R., Huntingburg, Ind.	Chief Surg. L. E. & St. L.	1890
McKee, J., Raleigh N. C.	N. C. Div. R. & D.	1890
McLeod, J. A., Ironwood Mich.	M. L. S. & W.	1890
Murrell, J. L., Benoit, Miss.	L. N. O. & T.	1890
McJunkin, J., Toccoa, Ga.	R. & D.	1891
McLean, W. F., Elyria, O.	L. S. & M. S.	1891
McComas, H. W., Oakland, Md.	B. & O.	1891
McComas, J. L., Oakland, Md.	B. & O.	1891
Mattice, M. B., Brookings, S. D.	C. & N. W.	1891
Mahon, J. B., Pittston, Pa.	L. V.	1891
Martin, C. M., Sunbury, Pa.	P. R. R.	1891
Montmillin, J. M., Ashland, Ky.	C. & O.	1891
Moore, E. O., Helena, Ark.	L. N. O. & T.	1891
McKnight, H. P., Long Pine, Neb.	F. E. & M. V.	1891
McKnight, E. J., 81 Main St., East Hartford, Conn.	N. Y. & N. E.	1891
Myers, W. H., Myersdale, Pa.	B. & O.	1891
Mountain, W. S., Confluence, Pa.	B. & O.	1891
McCulloch, T. C., Oil City, Pa.	W. N. Y. & Pa	1891
Morrow, W. B., Walton, N. Y.	N. W. O. & W.	1891
Mattoon, E. A., Salida, Colo.	D. & R. G.	1891
McLean, D., 72 Lafayette Ave., Detroit, Mich.	Chief Surg. M. C. & G. T.	1891
Morgan, C. F., Greenville, Mich.	D. L. & N.	1891
Markwith, A. F., Greenville, O.	C. J. & M.	1891
Moody, G. W., Huron, S. Dak.	C. & N. W.	1891
McIntyre, C. W., New Albany, Ind.	O. & M.	1890
Mears, J., Times Building, Kansas City, Mo.	Chief Surg. K. C. O. & S.	1891
Massey, C. V., Athens, Ill.	J. S. E.	1891
Miller, J. H., 813 W. Harrison St., Chicago, Ill.	I. C.	1891
McLaughlin, N. W., 9038 Houston Ave., South Chicago, Ill.		
Mayo, W. J., Rochester, Minn.	B. & O.	1891
Marburg, E. M., Pueblo, Colo.	C. & N. W.	1891
McLean, J., Pullman, Ill.	D. & R. G.	1891
Mosby, W. L., Bardwell, Ky.	P. P. C. Co.	1891
Monday, W. A., Terrell, Tex.	Ill. Cent.	1891
McFarland, A. F., Gallatin, Mo.	T. & P.	1891
McCallister, W. A., Centralia, Mo.	C. R. I. & P.	1891
McCallum, W., Gladstone, Mich.	Wab.	1891
	M. St. P. & S. St. M.	1891

ASSOCIATION OF RAILWAY SURGEONS.

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NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
McDonald, O. P., Keokuk, Lee Co., Ia.	Wab.	1891
Moss, N. P., Lafayette, La.	S. P.	1891
Miller, J. A., Rockland, N. Y.	N. Y. O. & W.	1891
Magee, J. L., Palouse City, Wash.	N. P.	1891
Morris, E. J., 1804 Chestnut St., Philadelphia, Pa.	B. & O.	1891
Maynard, H. J., 706 Eighteenth St. East, Cheyenne, Wyo.	U. P.	1891
Miller, D. W., Gilman, Ill.	I. C.	1891
McKay, W. T., Arkansas City, Kan.	M. P.	1891
McCleery, T. C., Exeter, Neb.	F. E. & M. V.	1891
McPeck, E. E., Bowerston, O.	W. & L. E.	1891
McCleery, J. D., Indianola, Ia.	C. R. I. & P.	1891
Mills, C. H., 204 Fosset St., Toledo, O.	Chief Surg. T. C. & C.	1891
McAlpine, W., Hope, Idaho.	N. P.	1891
More, C. W., Ely, Minn.	D. & I. R.	1891
Morton, J. H., La Veta, Colo.	D. & R. G.	1891
McCarty, T. L., Dodge City, Kan.	A. T. & S. F.	1891
McVay, J. D., Lake City, Ia.	C. & N. W.	1891
Northrop, G. J., 206 E. Ridge St., Marquette, Mich.	D. S. S. & Atlantic	1888
Nugent, W. R., Oskaloosa, Ia.	Chief Surg. Cen. Ia.	1888
Nesbitt, G. W., Sycamore, Ill.	C. & N. W.	1888
Nye, H., Enon Valley, Pa.	P. F. W. & C.	1889
Newkirk, A. B., 217 1/2 Spring St., Los Angeles, Cal.	B. & M. R.	1889
Newcomer, M. V. B., Tipton, Ind.	S. E. & W.	1889
Norwine, J. J., Bismarck, Mo.	M. P.	1890
Nolan, E. C., Mt. Pleasant, Ill.	P. D. & E.	1890
Nye, W. W., Hiawatha, Kan.	M. P.	1890
Nickell, G. M., Millboro Depot, Va.	C. & O.	1891
Nash, G. A., Maryville, Mo.	O. & St. L.	1891
Niles, A., Keeneyville, Pa.	F. B. C. C.	1891
Nihiser, W. M., Keedysville, Md.	B. & O.	1891
Nissong, J. D., Ironton, Mo.	St. L. & I. M.	1891
Nutt, G. D., 439 Market St., Williamsport, Pa.	F. B.	1891
Nelson, H. T., Charlottesville, Va.	C. & O.	1891
Neely, E. A., 126 Hernando St., Memphis, Tenn.	K. C. F. S. & M.	1891
Newcomb, W. K., Fisher, Ill.	I. C.	1891
Newland, T. J., Ellensburg, Wash.	N. P.	1891
Outten, W. B., St. Louis, Mo.	Chief Surg. Mo. Pac.	1888
Osborn, H. B., Kalamazoo, Mich.	L. S. & M. S.	1888
O'Connor, J. W., 212 Chusman Block, Denver, Colo.	Chief Surg. D. & R. G.	1889
O'Connell, R. S., Cato, Wis.	M. L. S. & W.	1889
Oven, J. P., Brookfield, Mo.	H. & St. J.	1889
Overstreet, W. C., 312 O St., Sedalia, Mo.	Mo. Pac.	1889
Owens, J. E., 1806 Michigan Ave., Chicago, Ill.	Chief Surg. C. & N. W.	1889
O'Brien, M. W., 807 Cameron St., Alexandria, Va.	R. & D.	1891
Oslin, J. W., Gainesville, Ga.	R. & D.	1891
Overstreet, J. A., Kingfisher, Okla.	C. R. I. & P.	1891
Owens, C. C., Maysville, Ky.	C. & O.	1891
Oettiker, J., Platteville, Wis.	C. & N. W.	1891
Olds, W. H., Sprague, Wash.	N. P.	1891
Olive, J. A., 49 Main St., Houston, Tex.	G. C. & S. F.	1891
Owings, J. H., Deer Lodge, Mont.	M. N. & N. P.	1891
Packard, N. J., Sturgis, Mich.	L. S. & M. S.*	1888
Pettijohn, N. J., Kansas City, Mo.	Chief Surg. K. C. Ft. S. & M.	1888
Pattison, I., Cor. Frederick and Jefferson Sts., Oel- wein, Ia.	M. & N. W.-B. C. R. & N.	1888
Payne, R. H., Richland, Ia.		1888
Peebles, G. H., Burr Block, Lincoln, Neb.		1888
Powell, D. T., Thayer, Mo.	K. C. F. F. S. & M.	1888
Pogue, J., Hillsborough Ave., Edwardsville, Ill.	Wab.	1889
Powel, C. B., Albia, Ia.	C. B. & Q.	1888
Pitman, J., Kirkwood, Mo.	Mo. Pac.	1889
Peck, W. F., 723 Brady St., Davenport Ia.	C. R. I. & P.	1889
Pritchard, J. F., Cor. Eighth and Buffalo Sts., Man- itowoc, Wis.	Chief Surg. M. L. S. & W.	1889
Phillips, W. A., Salina, Kan.	M. P.	1889
Parker, J., Colfax, Ind.	C. C. C. & St. L.	1890
Payne, J. D., Richland, Ia.	Cen. Ia.	1890
Phelps, C. H., St. Mary's, O.	L. E. & W.	1890
Philler, H., Waukesha, Wis.	C. M. & St. P.	1890
Porter, M. F., Ft. Wayne, Ia.	Wab.	1890
Poole, J. G., Downs, Osborne Co., Kan.	M. P.	1890
Priest, W. R., Concordia, Kan.	M. P.	1890
Putman, B. B., Bucklin, Mo.	A. T. & S. F.	1890
Pearman, J. T., Champaign, Ill.	Ill. Cent.	1890
Parke, C. R., 431 Washington Ave., Scranton, Pa.	N. Y. O. & W.	1891
Pendell, E. J., Newaygo, Mich.	C. & W. M.	1891
Pollock, J. K., 14 E. Fourth St., New Castle, Pa.	W. N. Y. & Pa.	1891
Peck, F. H., Clinton, N. Y.	O. & W.	1891
Peck, S. P., 33 Sumners St., Hinton, W. Va.	C. & O.	1891
Powell, W. S., Second and Jefferson Sts., Defiance, O.	Wab.	1891

PROCEEDINGS OF THE NATIONAL

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Price, O. J., 538 W. Adams St., Chicago, Ill.	C. A. & St. L.	1891
Pritchett, G. L., Fairbury, Neb.	C. B. I. & P.	1891
Parker, E. H., 204 S. Barstow St., Eau Claire, Wis.	W. C.	1891
Phillips, E., New Haven, Pa.	P. & L. E.	1891
Patton, W. R., Charleston, Ill.	T. St. L. & K. C.	1891
Palmer, H. K., 116 W. Main St., Trinidad, Colo.	D. & R. G.	1891
Phillips, N. D., P. O. Box 142, Gainesville, Fla.	S. F. & W.	1891
Porter, H. R., Bismarck, N. Dak.	N. P.	1891
Porter, J. L., Paola, Kan.	K. C. Ft. S. & M.	1891
Patterson, M. F., Fonds, Ia.	I. C.	1891
Pinkerton, S. H., 234 Main St., Salt Lake City, Utah.	R. G. W.	1891
Pope, I., Tyler, Tex.	I. & G. N.	1891
Paramore, H. B., 202 Locust St., Ottawa, Kan.	M. P.	1891
Purdue, G. C., 220 E. Douglas Ave., Wichita, Kan.	A. T. S. F. & F.	1891
Patten, A., Mineola, Tex.	T. & P.	1891
Patterson, J. M., Eads, Colo.	M. P.	1891
Proctor, S. A., Doniphan, Mo.	St. L. I. & M. S.	1891
Peckham, F. H., Providence, R. I.	N. Y. P. & B.	1891
Proudfoot, M. H., Rowlesburg, W. Va.	B. & O.	1891
Payne, R. L., Lexington, N. C.	R. & D.	1891
Quinn, A. L., Wilmington, O.	C. & C. M.	1890
Rogers, W. B., 69 Madison St., Memphis, Tenn.	Chief Surg. L. N. O. & Tex.	1888
Reed, A. B., 52 Second Ave., Cedar Rapids, Ia.	C. M. & St. P.	1888
Reed, R. H., Mansfield, O.	B. & O.	1888
Russell, L. E., Springfield, O.	Chief Surg. O. I. & W.	1888
Richardson, N. S., Macon, Mo.	Wab. Western.	1888
Rickey, J. C., Mt. Sterling, Ill.	Wab.	1888
Rice, J. T., Attica, Ind.	W. St. L. & P.	1888
Ristine, H., Cedar Rapids, Ia.	B. C. R. & N.	1888
Rhu, A., 123 S. West St., Marion, O.	C. C. C. & St. L.	1889
Rice, S. M., 20 S. Seventh St., Terre Haute, Ind.	Chief Surg. Vandalia Line.	1889
Redden, R. J., Sulligent, Ala.	K. C. M. & B.	1889
Robbins, S. D., Vicksburg, Miss.	Chief Surg. B. & M.	1889
Rainey, G. S., Salem, Ill.	O. & M.	1889
Robert, J. J., Hillsboro, Tex.	St. L. A. & T.	1889
Robinson S. E., West Union, Ia.	C. M. & St. P.	1889
Root, E. F., Exeter, Neb.	F. E. & M. V.	1889
Root, A. D., Crete, Neb.	M. P.	1889
Russell, J. E., 9 N. Main St., Mt. Vernon, O.	C. A. & C.	1889
Ragsdale, J. E., Gibson City, Ill.	Wab.	1889
Ransom, J. J., Topeka, Kan.	Chief Surg. G. C. & St. F.	1889
Rook C. W., 1101 Main St., Quincy, Ill.		1889
Reynolds, E. M., Centerville, Ia.	K. & W.	1888
Rambo, J. H., Glenwood, Mo.	Wab.	1890
Redmon, S. H., Tipton, Mo.	M. P.	1890
Rockwood, C. A., Nevada, Mo.	M. P.	1890
Robinson, E. M., Bessemer, Ala.	B. M. & B. B.	1890
Robinson, C. E., Clarksville, Ark.	L. R. & Ft. S.	1890
Reynolds, L., Horton, Kan.	C. R. I. & P.	1890
Reiger, J. H., Kansas City, Mo.	A. T. & S. F.	1890
Ross, B. B., Saginaw, Mich.	Chief Surg. F. & P. M.	1891
Reynolds, J. H., Adrian, Mich.	L. S. & M. S.	1890
Rhett, R. B., 109 Cannon St., Charleston, S. C.	Chief Surg. S. C.	1891
Row, E. W., Orange, Va.	R. & D.	1891
Reber, W. W., Lehighton, Pa.	L. V.	1891
Ritchey, J. A., Oil City, Pa.	N. Y. P. & O.	1891
Riddell, S. S., P. O. Box 1011, Chippewa Falls, Wis.	C. St. P. M. & O.	1891
Ross, G., 101 E. Franklin St., Richmond, Va.	Chief Surg. R. & D.	1891
Rood, C. A., Reedsburg, Wis.	C. & N. W.	1891
Rheinfrank, J. H., Perrysburg, O.	C. H. & D.	1891
Ross, J. F., Clarion, Pa.	Asst. Chief Surg. P. & W.	1891
Robinson, J. P., McCormick, S. C.	G. C.	1891
Renling, G., 103 W. Monument St., Baltimore, Md.	B. & O.	1891
Ross, W. F., Hot Springs, N. C.	R. & D.	1891
Rosborough, J. L., Senatobia, Miss.	I. C.	1891
Rowe, W. H., St. James, Minn.	C. St. P. M. & O.	1891
Rowland, P. W., Coffeetown, Miss.	I. C.	1891
Reynolds, O. C., Seward, Neb.	B. & M.	1891
Ristine, H. G., Market St., Fort Dodge, Ia.	I. C.	1891
Redd, R. G., Miles City, Mont.	N. P.	1891
Read, E. W., Mandan, N. Dak.	N. P.	1891
Rader, W. H., Durango, Colo.	D. & R. G.	1891
Richings, H., Rockford, Ill.	C. & N. W.	1891
Richardson, W. D., 224 N. Locust, Centralia, Ill.	J. S. E. Line.	1891
Riggs, S. M., Muscotah, Kan.	M. P.	1891
Reeve, J. T., 788 Lawrence St., Appleton, Wis.	C. & N. W.	1891
Straight, O. M., Bradford, Pa.	Chief Surg. A. & K.	1888
Sanders, J. W., Demersville, Mont.		1888
Shultz, J. B., Logansport, Ind.	C. St. L. & P.	1888
Spalding, W. C., Watertown, Wis.	C. & N. W.	1888
Stillings, F. A., 30 Pleasant St., Concord, N. H.	Concord.	1888

ASSOCIATION OF RAILWAY SURGEONS.

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NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Severance, LaG., Huntington, Ind.	C. & A.	1888
Scott, W., 28 Main St., Kokomo, Ind.	L. E. & W.	1888
Stemen, C. B., Ft. Wayne, Ind.	Chief Surg. Penna.	1888
Shuttee, H. C., West Plains, Mo.		1888
Stemen, G. C., Ft. Wayne, Ind.		1888
Stemen, C. M., 133 James St., Kansas City, Kan.		1888
Sommerville, J. A., Marinette, Wis.	M. & N.	1889
Sweeney, R. L., 205 W. Center St., Marion, O.	N. Y. P. & O.	1888
Stovall, A. M., Jasper, Ala.	K. C. M. & B.	1889
Sawtell, J. E., 8 Maple St., Gypsum, Kan.	M. P.	1889
Stone, M. W., Wahoo, Neb.	U. P.	1889
Scott, M. T., 127 N. Broadway, Lexington, Ky.	Chief Surg. L. & N.	1889
Scott, J. J., Holton, Kan.	U. P.	1889
Suggett, W. LeG., Flora, Ill.	O. M.	1889
Sawhill, W. F., Concordia, Kan.	M. P.	1889
Smith, E. J., Port Washington, Wis.	M. L. S. & W.	1889
Starkloff, M. C., 7620 S. Broadway, St. Louis, Mo.	M. P.	1889
Smith, C. A., Tyler, Tex.	Chief Surg. St. L. A. & T. S. W.	1889
Stuart, D. F., Houston, Tex.	Chief Surg. H. & T. C.	1889
Summer, J. B., Bloomington, Neb.	Mo. River.	1889
Shafer, G. R., Morton, Ill.		1889
Sutton, J. A., Argos, Ind.	N. Y. C. & St. L.	1889
Stewart, W. W., Clarksdale, Miss.	L. N. C. & T.	1890
Slager, J. L., Paulding, O.	C. J. & M.	1890
Sooles, J. P., Galena, Kan.	K. C. & Ft. S.	1890
Scott, J. T., Elnora, Ind.	E. I. & E.	1890
Shidler, G. W., York, Neb.	B. M.	1890
Shoptaugh, S. H., Princeton, Ind.	E. & T.	1890
Sims, W. A., Paragould, Ark.	St. L. & I. M.	1890
Sisler, L. E., Clinton, O.	C. A. & C.	1890
Smoet, C. F., Nickerson, Kan.	C. F. & S. F.	1890
Spilman, S. A., 236 E. Main, Ottumwa, Ia.	W. C. N. & S. P.	1890
Strickland, D. H., 134 W. Seventh St., Erie, Pa.	E. & P.	1890
Stanton, T. P., Chariton, Ia.	C. B. & Q.	1890
Summers, H. S., West Point, Neb.	F. E. & M. V.	1890
Sibley, C. W., Fairfield, Ill.	L. E. & St. L.	1890
Stockwell, C. M., Port Huron, Mich.	C. & G. T.	1891
Strickler, O. C., Cor. First and Main, New Ulm, Minn.	C. & N. W.	1891
Scott, A. H., Jr., St. Joseph, Mich.	C. & W. M.	1891
Snook, J. M., Kalamazoo, Mich.	M. C.	1891
Saltmarsh, G. A., Lake Village, N. H.	C. & M.	1891
Smith, A. H., Avon, N. Y.	N. Y. L. E. & W.	1891
Scott, J. W., St. Charles, Minn.	C. & N. W.	1891
Sanford, S., Palmyra, Mo.	H. & St. J.	1891
Smith, W. J., Lykens, Pa.	N. C. & P.	1891
Shields, S. S., Carbondale, Pa.	N. Y. L. E. & W.	1891
Stephens, F. M., Robt. Packer Hospital, Sayre, Pa.	L. V.	1891
Steward, J. J., Erie, Pa.	P. & E.	1891
Smith, S. S., Emporium, Pa.	W. N. Y. & P.	1891
Snowball, J. W., Flemington, N. J.	L. V.	1891
Senn, N., 532 Dearborn Ave., Chicago, Ill.	C. K. C. & St. P.	1891
Smith, C. F., Danforth, Ill.	I. C.	1891
Smart, E. N., Humphrey, Neb.	F. E. & M. V.	1891
Stockwell, J. K., 553 Bridge St., Oswego, N. Y.	N. Y. O. & W.	1891
Smith, N. P., 43 W. Court St., Paris, Ill.	T. H. & P.	1891
Smith, I. W., Charles City, Ia.	I. C.	1891
Shipp, M. W., Carbon Hill, Ala.	K. C. M. & V.	1891
Sutherland, H. H., Liberal, Kan.	C. R. I. & P.	1891
Stinson, J. B., Sherman, Tex.	T. & P.	1891
Shoffner, J. H., Water Valley, Miss.	I. C.	1891
Shoemaker, W. A., Dawson, Pa.	B. & O.	1891
Shipman, C. G., Ely, Minn.	D. & I. R.	1891
Shine, M. L., Winthrop, Ia.	I. C.	1891
Sawyers, S. H., Eldon, Ia.	C. R. I. & P.	1891
Saunders, H. J., 244 King St., Kingston, Ont., Can.	G. T.	1891
Sexton, L., Wesson, Miss.	I. C.	1891
Shoemaker, G. G., Butler, Pa.	P. & W.	1891
Standly, Z. T., La Clede, Miss.	C. B. & K. C.	1891
Stout, S. H., Cisco, Tex.	T. P.	1891
Salles, W. T., Sparta, Wis.	C. & N. W.	1891
Squires, H. S., Aguascalientes, Mex.	M. C.	1891
Stoddard, L. F., Ramsay, Ill.	T. St. L. & K. C.	1891
Stinson, C. H., Newark, O.	B. & O.	1891
Stine, C. H., Cedar Vale, Kan.	M. P.	1891
Saner, W. F., Hope, Ark.	St. L. I. M. & S.	1891
Sheffield, D. A., Apple River, Ill.	I. C.	1891
Taylor, J. W., Huntsville, Mo.	Wab. Western.	1888
Thorn, S. S., Toledo, O.	Chief Surg. W. & L. E.	1888
Thompson, G. W., Winamac, Ind.	Pan Handle.	1888
Thompson, G. T., Golden City, Mo.		1888
Tagert, A. H., Chicago, Ill.		1888

PROCEEDINGS OF THE NATIONAL

NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
Thompson, J. G., Angola, N. Y.	L. S. & M.	1889
Tressel J. H., Alliance, O.	F. F. W. & C.	1889
Tidd, C. H., Geneva, Ia.	C. I.	1889
Thompson, J. H., Kansas City, Mo.	W. W.	1889
Tiffany, F. B., Kansas City, Mo.	W. F.	1889
Tinder, T. T., Parsons, Kan.	K. C. F. S. & M.	1889
Tanner, H. B., Kaukauna, Wis.	M. L. S. & M.	1889
Tenney, A. P., Kansas City, Kan.	M. P.	1889
Thompson, W. H., Winamac, Ind.	C. & A.	1889
Talley, H. A., Wentzville, Mo.	Wab.	1889
Toombs, R. S., Greenville, Miss.	L. M. O. & T.	1889
Troupe, A. W., Pine Bluff, Ark.	St. L. A. & T.	1889
Towler, S. S., Marlionsville, Pa.	P. & W.	1889
Turner, E. N., Norton, Kan.		1889
Tandy, T. S., Kinderhook, Ill.	Wab.	1889
Temple, A. B., Chetopa, Kan.		1889
Taylor, S. B., Blair, Neb.	T. E. & M. V.	1890
Terry, N. F., Lyons, Kan.	M. P.	1890
Thompson, B., Tama, Ia.	C. & N. W.	1890
Thompson, A. A., Waxahachie, Tex.	M. E. & T.	1890
Thompson, W. A., Olney, Ill.	F. D. & E.	1890
Thomas J. W., Weeping Water, Neb.	M. P.	1890
Thomas, O. F., Chillicothe, Ill.	A. T. & S. F.	1890
Tiffin, C., Hamilton, Mo.	H. & St. J.	1890
Tranter, R. E., Oak Town, Ind.	E. & T. H.	1890
Tweedle J. B., Weatherly, Pa.	L. V.	1891
Taylor, E. C., Kalamazoo, Mich.	C. R. & I.	1891
Thayer, H. W., Corry, Pa.	W. N. Y. & P.	1891
Turner, E. F., Leland, Miss.	L. N. O. & T.	1891
Thompson, J. A., Traverse City, Mich.	G. R. & I.	1891
Trimmer, S. W., White Haven, Pa.	L. V.	1891
Taylor, H. M., Richmond, Va.	C. & O. R. R.	1891
Tobey, C. McV., St. Paul, Minn.	W. C.	1891
Tulley, W. M., Bowling Green, O.	D. & M.	1891
Thompson, C. Y., Beaumont, Tex.	S. P.	1891
Tarkington, T. A., Washington, D. C.	B. & O.	1891
Tolson, G. B., Melville, La.	T. & P.	1891
Taylor, Thos. L., Custer City, S. D.	B. & M.	1891
Thornton, T. F., Sturgis, Mich.	G. R. & I.	1891
Trowbridge, J. B., Hayward, Wis.	C. St. P. M. & O.	1891
Trescy, W., Helena Mont.	N. P.	1891
Truax W. E., Breckenridge, Minn.	G. N.	1891
Trueheart, P. P., Sterling, Kan.	M. P.	1891
Tape, J. W., Oak Park, Ill.	C. & N. W.	1891
Underwood, M., Eldora, Ia.	Gen. Ia.	1888
Ulrich, W. E., Chester, Pa.	P. W. & B.	1891
Vance, N. N., Bement, Ill.	W. St. L. & P.	1888
Van Meter, A., Lamar, Mo.	K. C. St. L. & M.	1888
Vincent, E. B., Sunman, Ind.	C. C. C. & St. L.	1888
Vincent, H. C., Guilford, Ind.		1888
Vanden G., Osperdon, W. Va.	C. & O.	1891
Vail, A. M., Rock Rapids, Ia.	I. C.	1891
Van Patton, E. H., Dayton, Wash.	U. P.	1891
Van Kirk, W. F., Grafton, W. Va.	B. & O.	1891
Wright, A. L., Carroll, Ia.	C. & N. W.	1888
Weaver, J. M., Dayton, O.	C. C. C. & I.	1888
Ward, W. A., Conneaut, O.	N. Y. O. & St. L.	1888
Wilson, J. H., Plymouth, Ind.	L. E. & W.	1888
Williams, S. T., Kendallville, Ind.	L. S. & M. S.	1888
Will, F. J., Eagle Grove, Ia.	C. & N. W.	1888
Wallace, J. S., Brunswick, Mo.	Wab. Western.	1888
Wallis, R. S., Arkadelphia, Ark.	St. L. I. M. & T.	1889
Wheeler, A. L., Mason City, Ia.	Gen. E. of Ia.	1890
Willson G. C., Nevada, Mo.	M. P.	1889
Witherington, W. T., Paragould, Ark.	St. L. S. W.	1889
Webster, E. E., St. Louis, Mo.	I. M. & St. P.	1889
Wade, J. T., Arlington, Neb.	F. E. & M. V.	1889
Wilson, Sen. B. F., Slater, Mo.	O. & A.	1889
Wright J. W., Columbus, O.	C. & C. M.	1889
Wise, S. P., Millersburg, O.	C. A. & C.	1889
Willis, L. E., Newport, Ark.	St. L. I. N. & T.	1889
Whitten, E. M., Nebraska City, Neb.	B. & M.	1889
Walden, D. A., Beatrice, Neb.	M. P.	1889
White, R. E., Norton, Kan.	C. R. I. & P.	1889
Walker, R. L., Mansfield Valley, Pa.		1889
Walls, J. T., Butler, Mo.	M. P.	1890
Watterman, W. M., Manchester, Kan.	A. T. & S. F.	1890
Weissinger, W. S., Hernando, Miss.	I. C.	1890
Wilson, C. E., Kansas City, Mo.	A. T. & S. F.	1890
White, L. R., Scandia, Kan.	M. P.	1890
Whitesides, J. W., Bessemer, Mich.	M. S. L. W. & D.	1890

ASSOCIATION OF RAILWAY SURGEONS.

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NAME.	NAME OF RAILROAD.	DATE OF MEMBER SHIP.
White, C. H., Reed City, Mich.	G. R. & I.	1890
Winton, C. F., Washington, Ind.	O. & M.	1890
Williamson, L., Como, Miss.	I. C.	1890
Williams, A. O., Ottumwa, Ia.	C. R. I. & P.	1890
Wilson, C., Birmingham, Ala.	S. & M.	1890
Worthington, D. H., Fairfield, Ia.	C. R. I. & P.	1890
Waterman, E. L., St. Francis, Kan.	B. & M. R.	1891
Wright, J., Sardis, Miss.	I. C.	1891
Warfield, R. B., Baltimore, Md.	B. & O.	1891
Weaver, W. G., Wilkesbarre, Pa.	L. V.	1891
Williams, H. J., Macon, Ga.	Ga. R. R.	1891
Williams, G. S., Muskegon, Mich.	G. R. & I.	1891
Williams, J. R., White Pigeon, Mich.	L. S. & M. S.	1891
Warner, C. F., Mankato, Minn.	C. & N. W.	1891
Williams, W. T., Mt. Carmel, Pa.	Penna. R. R.	1891
Webster, W. S., Liberty, N. Y.	N. Y. O. & W.	1891
Wood, J. K., Van Wert, O.	Penna. Co.	1891
Winkler, M. P., Tchula, Miss.	I. C.	1891
Watson, R. B., Lock Haven, Pa.	P. E. & T.	1891
Wheeler, H. C., Carbondale, Pa.	D. & H. Canal.	1891
Weidman, W. M., Redding, Pa.	W. & N.	1891
Workman, H. M., Tracy, Minn.	C. & N. W.	1891
West, T. H., Keyser, W. Va.	B. & O.	1890
Wilson, C. G., St. Mary's, Pa.	P. & E.	1891
Wheeler, H. M., Grand Forks, N. Dak.	G. N. & N. P.	1891
Weist, J. R., Richmond, Ind.	P. C. C. & St. L.	1891
Wooding, B. F., El Moro, Colo.	D. & R. G.	1891
Wilson, H. M., Evans City, Pa.	P. & W.	1891
Wagner, S. V., Fremont, Tex.	H. & T. C.	1891
Wilson, S. B. S., Olathe, Kan.	K. C. F. T. S. & M.	1891
Wallace, R. S., East Brady, Pa.	A. V.	1891
Woods, G. B., West Alexander, Pa.	B. & O.	1891
Williams, W. L., Ridgeway, Pa.	B. R. & P.	1891
Wear, I. N., Fargo, N. Dak.	N. P. & C. M. & St. P.	1891
Wilson, J. G., Perth Amboy, N. J.	L. V.	1891
Wood, I. C., Logan, Ia.	C. & N. W.	1891
Watt, W. N., Burton, Tex.	H. & T. C.	1891
Wahl, G. F., Bremen, Ind.	B. & O.	1891
Wiley, T. W., McKinney, Tex.	H. & T. C.	1891
Williams, C. A., Columbus, Tex.	S. P.	1891
Waite, I. W., Holyoke, Colo.	B. & M. R.	1891
Williams, W. W., Mattoon, Ill.	I. C.	1891
Warne, J. C., Cambridge, O.	Chief Surg. C. & M.	1891
Whitfield, A. J., San Luis Potosi, San Luis Potosi, Mex.	M. C.	1891
Woolsey, E. H., Oakland, Cal.	P.	1891
Webster, E. M., South Chicago, Ill.	B. & O.	1891
Wilcox, A. W., Laredo, Tex.	I. & G. N.	1891
Wiley, T. R., Gibson City, Ill.	I. C.	1891
Wireback, I. J., St. Petersburg, Pa.	P. & W.	1891
Wakefield, W., Lake Benton, Minn.	C. & N. W.	1891
Weeks, A. J., Correctionville, Ia.	I. C.	1891
Williams, R. R., Manning, Ia.	C. & N. W.	1891
Young, G. M., Evansville, Ind.	E. & T. H.	1889
Yancy, E. F., Sedalia, Mo.	M. K. & T.	1889
Young, T. B., Poseyville, Ind.	P. D. & E.	1890
Young, T. J., Titusville, Pa.	W. N. Y. & P.	1891
Yates, O. E., Holland, Mich.	C. & W. M.	1891
Young, J. W., Broomfield, Ia.	Wab.	1891
Zwetsch, J. D., Gowanda, N. Y.	B. & S. W.	1891

APPENDIX E.

A PAPER BY DR. A. W. RIDENOUR.

The following paper was prepared by the late Dr. A. W. Ridenour of Massillon, O., to be read to the fourth annual meeting of the National Association of Railway Surgeons.

CASE OF FRACTURE AND DISLOCATION OF THE SPINE, WITH OPERATION.

In view of the rarity of these cases with the almost invariable result, I have thought proper to report a case that marks a new era, at least in my practice.

We will remember at the start the severe trauma the cord underwent; the bones crushed; muscles and ligaments torn loose.

Dec. 11, 1895, Martin Nye, aged twenty-eight, a laborer, while driving through a shed on a load of lumber was caught between an overhead beam in such a manner as to crush the center of his back forward at an acute angle, frightfully lacerating and crushing both hard and soft parts in that region.

Within half an hour after the accident found the patient pulseless, skin cold and clammy, respiration sighing; very restless; jactitation, suffering frightful pain in back; sensation and motion absent from injury down; knee jerk absent; reflex absent.

On inspection at seat of injury found depression of fully one inch corresponding to the seventh dorsal vertebra, with absence of spinous process of eighth dorsal. This at once led me to inform the patient and friends of the exceeding gravity of the case, and that the only hope of life lay in a speedy operation. Consent was readily given and at once carried out.

With the usual and necessary antiseptic preliminaries, an incision about twelve inches long was made, commencing at the third and terminating at the ninth dorsal, separating muscles from either side and exposing all bony roof of cord from the sixth to and including the ninth dorsal. The muscles were crushed, soft, pulpy and mangled beyond recognition in region of injury. The lamina of seventh dorsal broken and separated from the body; transverse process either side of seventh fractured, with facets for ribs torn completely off; ends of ribs stuck up in wound like two fists; the body of seventh vertebra was dislocated forward fully one inch or nearly slipping out in front. Spinous process of seventh vertebra was split and crushed.

The spinous process of the eighth dorsal was not only split but actually inverted, penetrating the cord, crushing it. The lamina of eighth fractured; the body of eighth fractured, but not dislocated. The membranes were punctured and badly lacerated at different points with free hemorrhage in the arachnoid space. The cord was crushed at juncture of seventh with eighth by the inverted spinous process of eighth; the cord was carried forward with the dislocated seventh vertebra; compression at juncture with sixth and eighth. Altogether I cannot conceive of a more frightful injury, unless we might include cutting off the cord and immediate death of patient. Did not use trephine, did not have to. Do not think it safe to trephine the spine. The bones being soft can be separated readily with safer bone instruments.

Removed all bony roof from middle of ninth dorsal to and including middle of sixth dorsal vertebra; passing my finger between the body of seventh dorsal,

elevated it into position; smoothed all rough or sharp bony prominences; removed all clots; stopped all hemorrhage; replaced dislocated ribs as well as I could without any articular facets, and placed strands of catgut along bottom of wound in such a manner that the cord would not come in contact with them, or in fact with anything (requiring some care here in the disposal of remaining bones and overlying muscles). Sutured muscles carefully on either side; sutured skin, applied dry dressing.

The after treatment of this case was uneventful. The sensation returned at once in both lower extremities, motion perceptible in recti muscles at end of fourth day. Compelled to use catheter to pass urine until the seventh day when it passed normally. No control over sphincters until the end of first week, restored. Knee jerk restored at end of second week; could raise limbs from bed at end of fifth week; can walk with crutches at end of three months. Applied plaster of Paris jacket for support at end of second week.

The wound healed without any pus and with three dressings primarily in one week. No fever at any time. Urine did not present any albumen or sugar, no casts or abnormal deposits, sp. gr. 10-20.

Patient suffered no pain after operation; no atrophy of muscles of lower limbs since operation; joints not thickened. Patient walks about with the aid of cane, June 5, 1891.

The patient is under care of Dr. Marchand of Canton and is at the Stark County Infirmary. The doctor reports the patient as rapidly recovering his bodily vigor, can get around readily and that the plaster was removed during April. There is no deformity at all. I would have wished the plaster had remained on longer but it seems no ill effects followed its removal. I was kindly assisted in the operation by Drs. Miller and Reed of Massillon.

The only plea I have to make in these cases where the diagnosis is made is for an immediate, thorough and careful operation; a few hours' delay in my opinion is sufficient to render the operation futile, and I have no hesitation in placing the cause of failure in so many of these operations to delay.

Some eight years ago I reported a case to this society where I had made the operation three years after injury with the result of complete failure, patient dying two weeks after of acute albuminuria.

But in doing this work the utmost care is required not only in removing all bony or other foreign material from the vicinity of the cord, but that no possible chance for subsequent hemorrhage or pressure from exterior cause can occur, as even the pressure of superimposed muscle will be sufficient to deprive the cord of life, or a small shaving of bone will cause inflammatory softening and death. Slight hemorrhage will cause a clot that will act more rapidly than in the brain in causing death; but the operation can be done and should be made safe by care and without hurry, and I will repeat, without delay. No patient should be allowed to die without an attempt by an operation to save him.

APPENDIX F.

AN AMBULANCE, HOSPITAL AND FUNERAL CAR.

The following paper was prepared for the fourth annual meeting of the National Association of Railway Surgeons, held at Buffalo, N. Y., April 30 and May 1, 1891, by Stewart L. McCurdy, M. D., Dennison, O.:

When it was decided to transport our martyred President Garfield from Washington to Elberon an ambulance car was improvised at unlimited expense for the purpose. Not a week passes without a demand for some more complete method of transporting the sick, the injured and the dead. The most complete funeral car this country has is a reconstructed express car, such as was used when Gen. Sherman's remains were transported from New York to St. Louis. The only present method of moving the sick is to place them in a Pullman car with other passengers, compelling all to breathe the same air, possibly laden with bacteria or at least with unpleasant odors. Private funeral parties prefer to travel unnoticed by the gaping and curious public. Not infrequently have I been at wrecks where the officials, ever ready to do their best to relieve the sufferings of their unfortunate employes, have sent a special engine and coach a distance of fifty or sixty miles to remove one man to his home.

The Paris, Lyons & Mediterranean Railway has a sanitary train which is used expressly for the purpose of moving sick passengers and sick and injured employes. Austria has almost a perfect system of ambulance trains, each capable of conveying 100 wounded persons, besides surgeons, dressers, stores, etc. England has various arrangements for the transportation of the injured in military and railroad service.

All are familiar with the various means improvised to carry the sick and injured in this country at the present day. Nothing complete or systematic, I believe, has been adopted by any railroad or by this Government, but instead the surgeon in charge of transporting the sick and injured is compelled to improvise measures for making his patients comfortable. I have received injured persons lying on floors of baggage or freight and stock cars, on letter boards of mail cars, or on piles of mail sacks on the floor of a mail car and in almost every other conceivable position.

This lack of a more complete system of caring for and transporting the sick and injured is not because the officials of the various roads do not do all in their power to make them comfortable or the surgeons or physicians lack in ingenuity, but is due to the fact that in time of peace they do not prepare for war.

To some it might seem at first thought that a railroad must intend to mangle employes and passengers were it to make such complete and extensive arrangements as to have a car especially provided for their transportation. As well assume that steamship and steamboat companies are courting accidents and dangers when they provide life preservers. This car, however, has a wider field of usefulness than the transportation of injured and sick railway employes or injured passengers. Besides being so planned as to make it all that could be desired in transporting sick and injured it should also be a complete operating room, for which it would be in demand frequently, and it would be found to serve a still more useful purpose as a funeral car.

No one but officials of railroads know how frequently they are called upon to furnish a coach and baggage car for funeral parties who desire to take the remains of relatives or friends hundreds of miles or for the carrying of an eminent states-

man from one point to another, often hundreds of miles. Families who desire private funerals and who have occasion to take their dead by rail to their last resting place would here find that privacy that is so much appreciated.

A car thirty feet long and of standard width and height, provided with an ordinary door at one end and two at the other and arranged as shown by ground plan herewith given, would, I think, amply supply a long-experienced need.

The interior has a main department, F, containing two ordinary day coach seats, two side bunks, seven feet by twenty inches, which can be either used for seats for injured or for sleeping, and which swing down against the wall when not in use. This main room is intended for many purposes, viz., for carrying injured from wrecks, the sick to hospitals or to their homes, the dead for funerals, and as a dining room or reception room when used as a special or pay car.

When used for private funerals of small families and it is desired to eat and sleep in the car the remains can be placed across the car as per dotted lines G behind a curtain which separates this apartment from the main part of the car and apartment F can then be used as a dining room.

It is intended that in transporting the sick and injured they shall be placed on stretchers and suspended by four ropes or straps from poles made of hickory or other elastic wood. This was essentially the arrangement adopted for President Garfield's trip and is conceded to be the best method for overcoming the jostling of a moving train. (See cut as to method of securing poles.) Springs, both spiral and elliptical, have also been used for this purpose with some claim to the successful overcoming of this jostling.

The two corner doors are made so that they need not be removed in order that a stretcher or coffin may be passed into the car. This has been the greatest difficulty I have experienced at wrecks in transporting sick and injured. To get a patient into a car in the center of a train we are compelled either to uncouple and separate the cars or to remove him from the stretcher and carry him in the arms of three or four men up the steps, over the platform and through the door, always a difficult operation. Every railway surgeon has tried it and knows from grievous experience the truth of this statement. After all this labor by the surgeon and his assistants and suffering on the part of our patients we encounter another obstacle, viz., the securing of a suitable place for the patient to rest. To put him on the stretcher again and place this on cushions would require the removal of one seat back, which would necessitate the using of three seats of the coach. At the end of our journey all these difficulties would again be encountered.

While the labor of four to six men required to handle the patient is considerable it is not to be compared to the untold sufferings to which the patient himself is subjected even under the most careful manipulation. With corner doors and a stretcher that will pass through them all this trouble can be obviated.

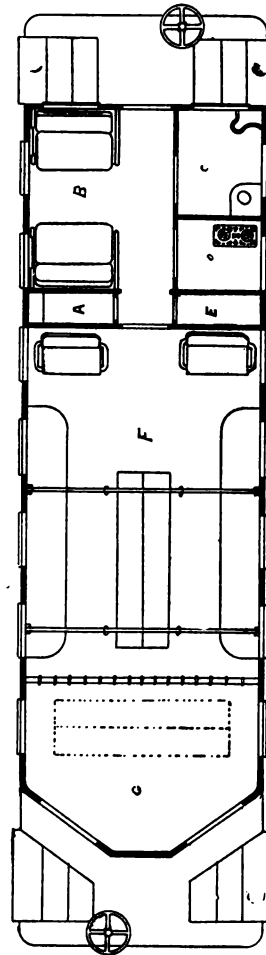
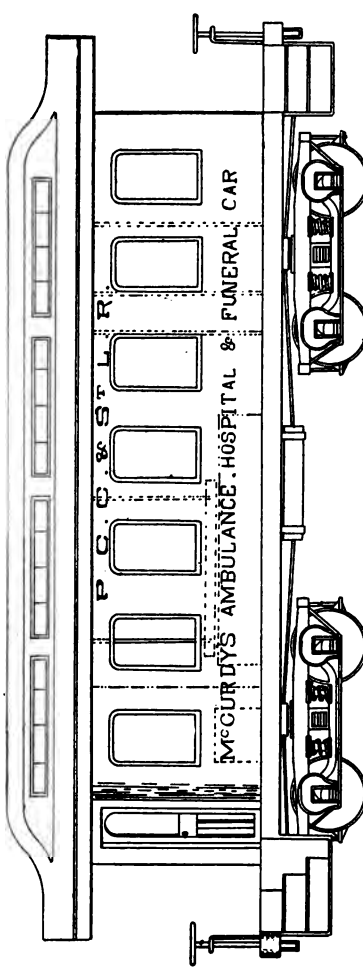
When it is desired to view the remains they should be placed as shown by the dotted lines G and the curtain should be closed so that the rest of the car remains private. By opening both the corner doors the viewers can pass in through one end and out through the other without molesting the occupants of the car.

Apartment B is an ordinary double berth bunk which will sleep or seat four. Apartment C is a water closet. Apartment D contains a stove for heating and cooking purposes, kitchen utensils, etc. The closet A is for surgical supplies, instruments, etc., and closet E is for linens, mattresses, etc., to be used on stretchers, etc. A folding frame is kept in closet A with supplies, etc.; also a folding table top. The frame is to be used as an operating table, for the support of a coffin, or for the folding table top for dining use. Above the closets space is left to store

a half dozen stretchers and folding chairs. The rear platform is inclosed for observation purposes.

This car will comfortably sleep six and by the use of stretchers several more. It will seat from sixteen to twenty. It can be used as a special or private car without any distinguishing feature to indicate that it was intended for that purpose only. The drop seats along the side are twenty inches high and can be used for seating while the car is used for dining purposes.

This car will be of special value to railroads that have their medical and surgical departments thoroughly organized and under the management of one head—a surgeon-in-chief—with a thorough system of central and way hospitals located every 100 to 300 miles. While I am almost certain that I am not in advance of the demand for such a car I may be a little in advance of the officials' ideas for their positive necessity. It will come, however, and before many years, too, in this country as it has in Europe.



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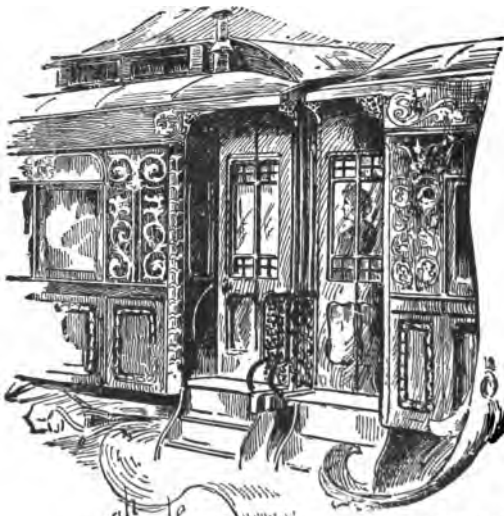
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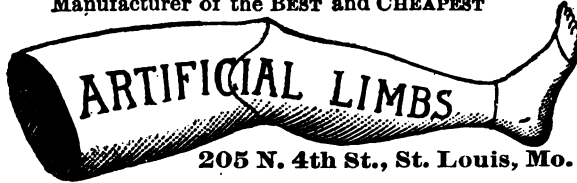
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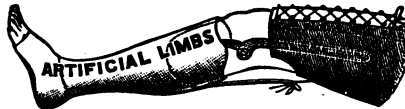
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